ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
MSc Economics & Business
Master Specialisation Financial Economics

MIS-VALUATION OF CYCLICAL COMPANIES

AN EMPIRICAL RESEARCH

Author: D. Tremolizzo
Student number: 315132
Thesis supervisor: Dr. W.L.J. Schramade
Finish date: July 2009

PREFACE AND ACKNOWLEDGEMENTS

This master thesis would not be possible if my parents did not support me, so special thanks to my father and to my mother that always pushed me and encouraged me with great enthusiasm leading me to the end of the master.

Thanks to my Laura that always believed in me and that, despite her strict work obligations, never left me alone one single second during the master.

Huge thanks to prof. Schramade, for his ‘remote’, but really close and effective support.

Finally, special thanks to all the great people I met in the Netherlands, they helped me to enrich myself and to spend one of the best years in my life in that wonderful and free country.

NON-PLAGIARISM STATEMENT
By submitting this thesis the author declares to have written this thesis completely by himself/herself, and not to have used sources or resources other than the ones mentioned. All sources used, quotes and citations that were literally taken from publications, or that were in close accordance with the meaning of those publications, are indicated as such.

COPYRIGHT STATEMENT
The author has copyright of this thesis, but also acknowledges the intellectual copyright of contributions made by the thesis supervisor, which may include important research ideas and data. Author and thesis supervisor will have made clear agreements about issues such as confidentiality.

Electronic versions of the thesis are in principle available for inclusion in any EUR thesis database and repository, such as the Master Thesis Repository of the Erasmus University Rotterdam

ABSTRACT

Aim of this master thesis is to understand if business cyclicality decreases the accuracy in corporate valuation. To assess the existence of any kind of potential misvaluation, a multiple approach analysis is performed for two samples of companies: cyclical and non-cyclical companies. The following multiples: current EV/EBIT; current EV/EBITDA; current and forward P/E have been computed for a sample of 174 companies listed on the London Stock Exchange during the interval 1995 - 2007. In the first place I have compared the estimated value with the observed value on the market for both samples, the difference is called Valuation Error (VE) and could be considered a proxy for valuation accuracy. If VE is significant, one can conclude there is a potential misvaluation. I found VE to be higher for companies categorized as cyclical. As a second step, I performed a OLS analysis in order to understand which are the potential variables affecting valuation errors. Finally, a Logit analysis confirms the results from the OLS model. The dummy variable indicates cyclical companies have a positive effect on the magnitude of VE. Volatility of companies' earnings increases VE, while the larger the company being valued, the smaller is the VE (more accurate valuations).

Keywords:
Valuation; multiples; cyclicality; comparables companies; DCF.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

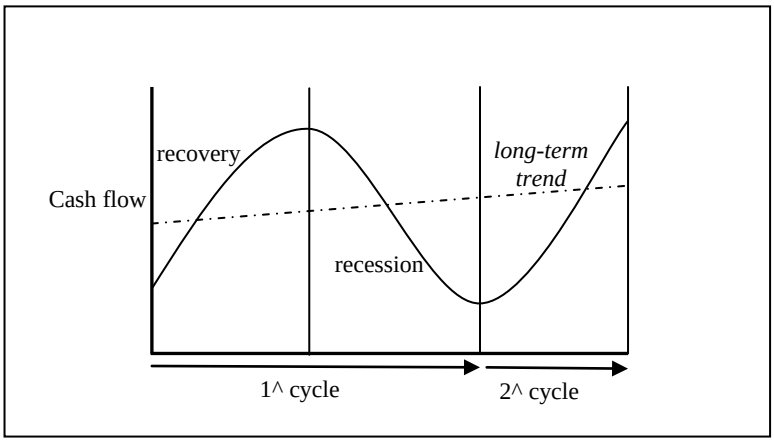
CHAPTER 1 Introduction

A business cycle can be defined as a:

"recurrence of periods of expansion (Recovery) and contraction (Recession) in economic activity with effects on inflation, growth and employment. One cycle extends from a Gross Domestic Product base line through one rise and one decline and back to the base line, a period typically averaging about $2^{1/2}$ years. [...]. A business cycle affects profitability and cash flow, making it a key consideration in corporate dividend policy, and a factor in the raise and fall of the inflation rate, which in turn affects return on investments."[1]

A graphic representation is given in figure n.1.

Figure 1 –Typical cash flow path within a business cycle.



As shown in the picture, the base line is the trend line, which represents the long term average of cash flow. The cash flow line departs temporarily from the base line in order to reach the peak and then to follow again towards the base line and finally to the trough point, where it ends the first cycle. By raising again it enters the second cycle and then it follows the same path as the one mentioned before.

Business cycles are of common occurrence in developed economies. After the second World War, there have been 11 recessions, indicating that, on average, a recession occurs every six years[2]. Even if a recession starts from a single industry (as in the dot-com case) it is expected to spread in a short period of time to the other sectors of the economy.

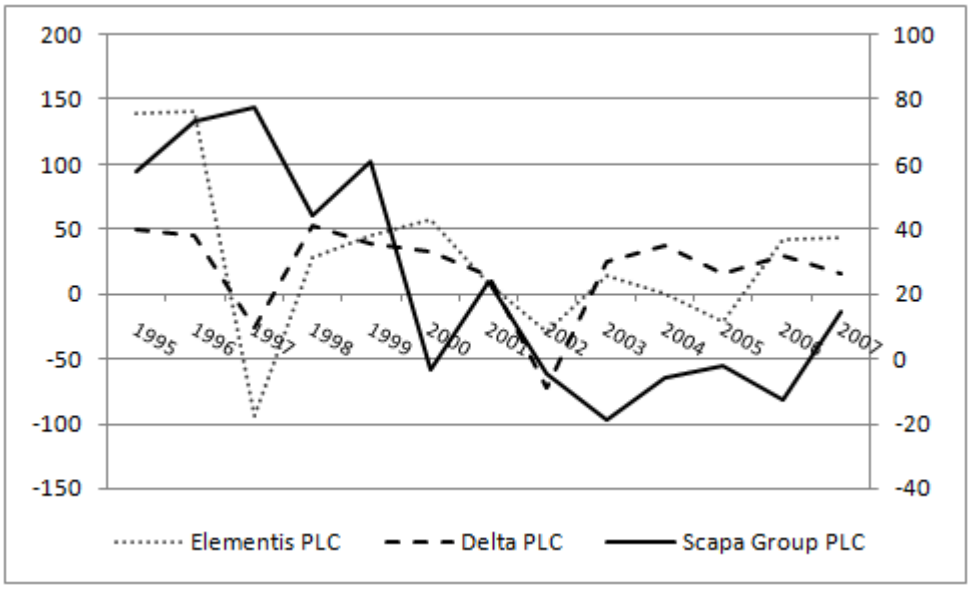
By looking at Earnings Before Interest and Taxes as a measure of "cash flow" in the interval 1995 - 2007 for a sample of three companies listed on the London Stock Exchange of a typical cyclical sector

[1] Downs J., Goodman J.E., *Dictionary of Finance and Investment Terms.* Barron's Educational Series, Seventh Edition, 2006

[2] From www.nber.org/cycles

as ‘Chemicals and Allied Products’ one can see that, during the years, EBIT follows a certain cyclical behaviour very similar to the one described in the definition above (figure n.2).

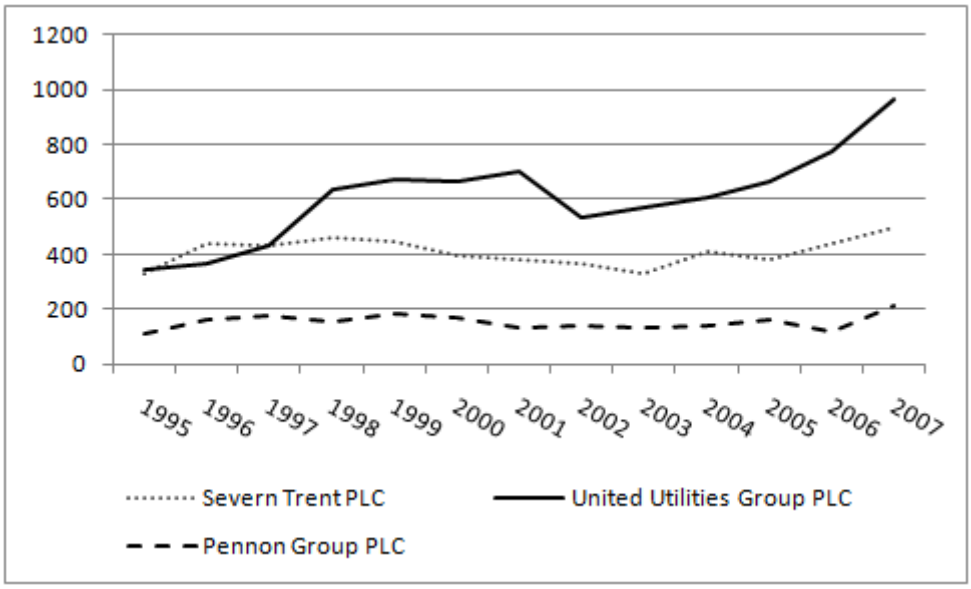
Figure 2 - EBIT path for the interval 1992 to 2007 of a sample of companies from the cyclical industry: Chemicals and allied products.



For example, the company ‘Scapa Group Plc’ shows a clear cyclical behaviour. Until 2000, the company shows two cycles; starting from 2000, the company continues to show a cyclical behaviour but its earnings stabilize on a lower trend line. Looking at EBIT peaks and troughs during the whole periods, at least 3 cycles are clearly distinguishable in the picture for ‘Scapa Group Plc’.

Looking now at a sample of companies, again listed on the London Stock Exchange, but belonging to the Utilities Industry (Electric, Gas and Sanitary Services), a typical non-cyclical sector, it should be observable a more stable path of EBIT along the interval of years. Figure n.3 presents the path of EBIT for three English companies within the interval 1995 to 2007.

Figure 3 - EBIT path for the interval 1992 to 2007 of a sample of companies of the Utilities (Electric, Gas and Sanitary Services) Industry.



Previous literature points out the considerable difficulties in evaluating cyclical companies. Copeland et al. (2005) suggest that volatility of earnings of cyclical companies introduces additional complexity in the valuation of cyclical companies. In the opinion of Copeland et al. (2005), the big fluctuation is driven by big changes in products' prices of companies pertaining to cyclical industries as primary metal, electronics, chemicals, etc. In their work, Copeland et al. (2005) also note that the share price of cyclical companies is more volatile than the share price of non cyclical ones; based on these observations, they suggest a probabilistic approach when valuing cyclical companies with DCF analysis.

De Heer et al. (2001) found that consensus forecast for cyclical companies appeared to entirely ignore cyclicality. They verified that consensus shows an upward sloping trend, regardless of whether the companies were at the peak or at the depression point of the cycle.

The theoretical conclusions of the two studies here mentioned, point out the complexity related to the valuation of cyclical companies and the consequent possible greater misvaluation, when assessing their value. Aim of this work is to empirically test the hypothesis that the existence of cyclicality diminishes the accuracy of valuation. The research question of this work is: "*does companies' earnings cyclical behaviour increase misvaluation?*"

In order to answer to the question, I have analyzed a sample of companies through a multiples analysis. Lot of literature has been written about valuation with multiples, but none of the studies was aimed at comparing the quality of estimates for a sample of non-cyclical companies with the quality of estimates for a sample of cyclical companies. To mention some of them, Kaplan and Ruback (1995), Kim and Ritter (1999), Gilson, Hotchkis and Ruback (2000) and Lie and Lie (2002) found that assets multiples (e.g. Enterprise Value to EBITDA, EV to EBIT) are more accurate than sales multiples (e.g.

price to sales, EV to sales) or equity multiples (e.g. P/E, market value to book value); Kim and Ritter (1999) show that forward multiples work better than historical ones.

I have analyzed two samples of companies. The first sample is composed of 101 companies coming from four cyclical industries (selected on the basis of the results from Boudoukh et al., 1994), while the second one is composed of 73 companies coming from four non cyclical industries. Both samples of companies are valued yearly, during the same interval of years (1995 - 2007). All the companies selected for this analysis are listed on the London Stock Exchange. The multiples chosen for the valuation are current EV/EBIT multiple; current EV/EBITDA multiple; current and forward P/E multiple. Once the estimated value (EV) is obtained, I have tested the implications of cyclicality on the valuation accuracy. As a first method, I have simply compared the Estimated Value with the observed value (OV) on the market. If, on average, VE of cyclical companies are greater than VE of non-cyclical ones, one can conclude that business cyclicality decreases the accuracy of valuation. As reported in different studies, focused on the determination of the accuracy of different types of multiples in valuing companies (e.g. Fidanza, 2008), the procedure used to assess the difference between the observed and the estimated value is computed by the following formula:

$$VE_t = |ln(EV_t) - ln(OV_t)|$$

Where VE_t represents the Valuation Error, EV_t is the Estimated Value (by multiples) and OV_t is the Observed Value on the market. The more the value of VE is close to zero, the more the valuation for a specific company in a specific year is accurate.

Furthermore a OLS analysis is performed in order to understand which are possible factors influencing the valuation error magnitude. By including in the model a dummy variable for the cyclical companies, I could understand how cyclicality affects the accuracy of valuation. As a robustness test, I carried out a Logit analysis which confirmed much of the results from the OLS model.

Finally, once an empirical answer to the researching question is given, I have shortly reported possible strategies that management of cyclical companies can undertake in order to manage cyclicality. As pointed out by Copeland et al. (2005), even if the management of a cyclical company has a greater amount of private information about the earnings behaviour of its company, it seems that it does not take advantage of it, by, for instance, issuing stocks when the company is at the peak of the cycle. Aim of the management should be to disentangle the company from the negative effects of cyclicality or, at least, to extend the upswing phases or to cut short the downswing phases of cycles. Looking again at the EBIT of the sample of companies in the Primary Metals Industry, in figure n.2, 'Scapa Group Plc' shows a deep volatility of its earnings during the period 1995 - 2007. The management of this company has to take drastic actions in order to lower the negative effects of its company earnings' cyclicality.

CHAPTER 2 Previous literature and theory

2.1 Introduction

The first part of this chapter provides an overview of previous literature and studies on business cyclicality and multiples approach in corporate valuation. The second part of the chapter presents an overview of theories related to the two subjects. Finally, the last paragraph reports the theoretical hypothesis of this master thesis.

2.2 Previous Literature

2.2.1 Cyclicality

Research studies did not devote too much attention to companies earnings' cyclicality. Among the few relevant studies, Copeland, Koller and Murrin (2005)[3] analyze, from a theoretical point of view, how to approach valuation of cyclical companies.

In their work Copeland et al. (2005) point out the additional complexity involved in the valuation of companies that show high volatility of earnings and, on the basis of a share prices analysis, they suggest a possible approach to the valuation process. This approach takes in consideration fluctuations of earnings within the cycle and potential implications in terms of strategic decisions for the company management. They noticed a fundamental mismatch between theory and reality in the estimation process. Cyclical companies are so defined because their earnings, on average, fluctuate more than earnings of other companies. Copeland et al. (2005) attribute the fluctuations of earnings to big changes in the prices of the goods sold and the change of prices is due, in their opinion, to industry specific reasons. To mention some examples, in the airline industry cyclicality of earnings seems to have origin from the macroeconomics trends; in the paper industry, cyclicality is mainly driven by industry characteristics as capacity, etc. Copeland et al. (2005) affirm that cyclicality brings to large fluctuation of share prices and in their opinion this does not seem to be in line with the classic Discounted Cash Flow (DCF) theory of valuation. DCF approach reduces the expected cash flow to a single number; by averaging out every kind of fluctuation only the long term trend really counts for the final result. Therefore if one compares the variations of share prices with a series of DCF values obtained for the same company, for a limited interval of years, he can notice that, in presence of cyclicality, the DCF values show much less erratic paths. For this reason, Copeland et al. (2005) believe that there is a mismatch between the reality, represented by the share price of the valued company and the theory, represented by the DCF valuation results. In other words, they believe the

[3] Copeland T., Koller T., Murrin J., *Valuation: Measuring and Managing the Value of Companies*, Fourth Edition by McKinsey & Company, Inc., June 8, 2005.

classical DCF method is not appropriate when valuing cyclical companies. In support of this theoretical conclusion Meitner (2004) believes that, for companies for which it is more complicated to forecast the expected cash flow a valuation with multiples could provide with better results. In order to overcome the supposed unsuitability of DCF approach in valuing cyclical companies, Copeland et al. (2005) suggest to combine the DCF method with a probabilistic approach, by assigning a 50% probability to a future development of the expected cash flow in line with the long term historical trend of the company (i.e. by incorporating the "historical" cyclical behaviour of earnings) and a 50% probability of future development of expected cash flow in line with analysts' believes.

In the last part of their work, Copeland et al. (2005) suggest how managers can take advantage of business cyclicality. First of all they point out that, even if managers have private and superior information about their company, they usually tend to follow analysts' forecasts in taking their investment decisions, expecting always an upward sloping of earnings, without taking in consideration the actual position in the cycle of their company. Managers of cyclical companies usually invest when they have a great deal of cash (usually at the peak of the cycle where prices are high and it is particularly costly to expand) since they suppose that prices - and consequently the value of their investments - will remain at high levels. Conversely, they tend to retrench when prices are low. By acting in this way, managers send a wrong signal to the market; for example, by expanding at the peak of the cycle, they are signalling to the market that their company will keep the same level of profits, just before another downturn is coming. Copeland et al. (2005) suggest how managers can exploit their superior knowledge. They suggest that management could adopt a better timing strategy in terms of capital spending and financial strategies, for example by issuing stocks at the peak of the cycle and repurchasing them at the cycle's trough, when the stocks are cheaper. They also affirm that, by pursuing a trading strategy for which managers systematically buy cheap assets at the trough of the cycle and sell them at higher prices at the peak, companies could more than double their returns. Of course in such a trading strategy, management would face difficulties in persuading shareholders to take actions that, at a first glance, appear to be contrarian to the market outlook and therefore with apparent value destruction consequences. In line with this view, some firms are known to follow an opposite strategy, i.e. to increase their spending (especially on advertising). Empirical evidence show that companies that view the downturn as an opportunity, and develop aggressive advertising responses to it, can improve their performance, even during a trough point of the cycle (Dhalla, 1980; Rigby, 2001; Srinivasan e al. 2002).

Another work that explicitly takes in consideration cyclicality of earnings in corporate valuation is the paper from De Heer, Koller, Schauten and Steenbeek (2001)[4]. In their work, De Heer et al. (2001) confirm the difficulties in valuing cyclical companies, especially when their share prices behave in a way that seems not to be related to the value obtained by discounting back the cash flow of the

[4] De Heer, M., Koller, T., Schauten, M.B.J., Steenbeek, O.W., 2000 (September, 1st version), "The valuation of cyclical companies".

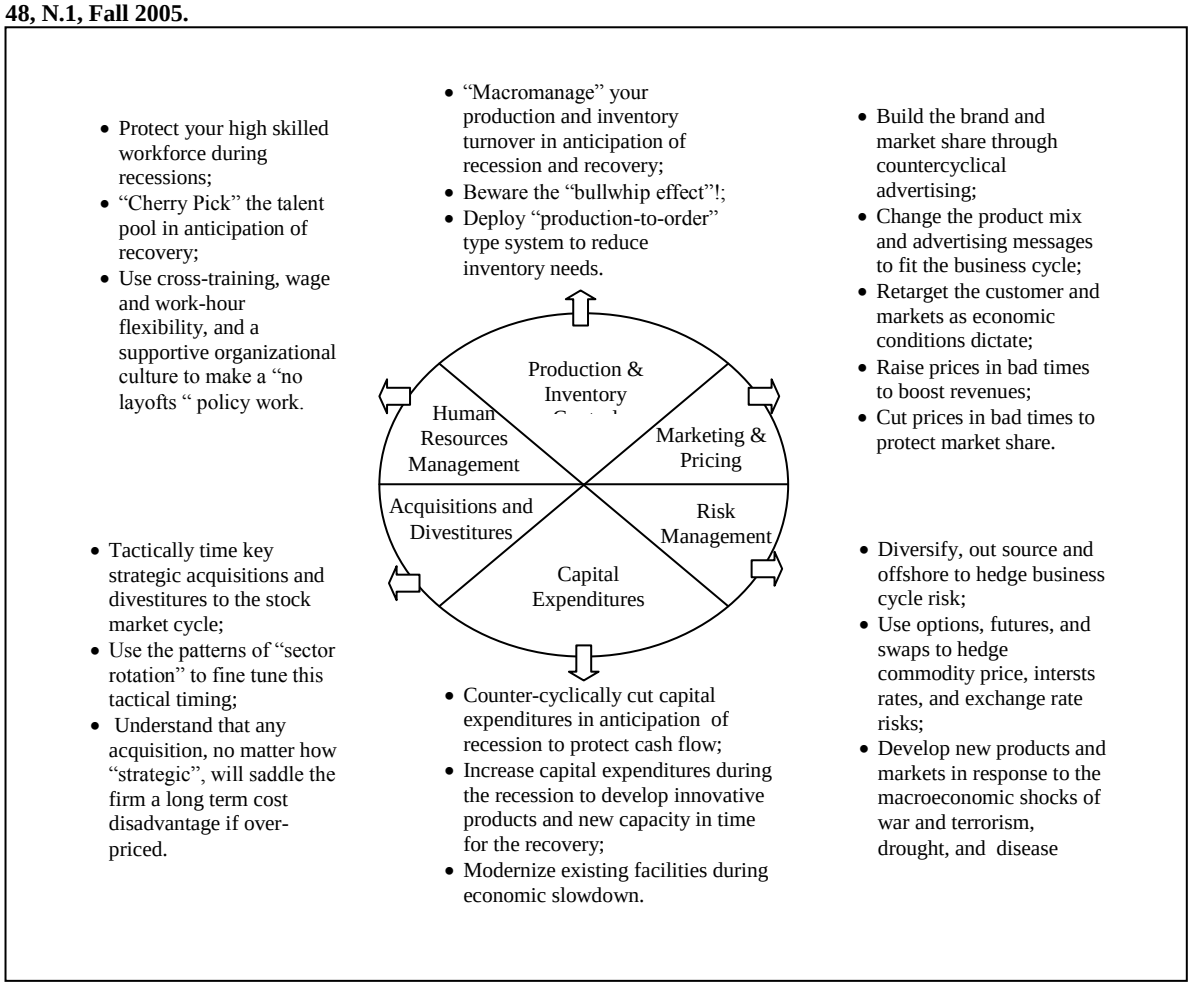
company. The analysis shows as analysts are usually biased when trying to estimate expected cash flow of cyclical companies. By performing a DCF analysis based on analysts' forecasts, they show that the value of cyclical companies is significantly higher at the peak of the cycle and lower at the trough of the cycle, compared to the value of the same sample of companies based on a DCF analysis carried out with realized earnings.

The paper provides three reasons for the misalignment between actual earnings and analysts earnings' forecasts. The first two reasons are related to the business relationship that links analysts at their clients. As a first reason, the analysts could have an incentive to issue optimistic forecasts in order to maintain a good relationship between themselves and the client, since a bad relationship could undermine the communication lines between the analyst and the company in the next future. A second reason arises from the relationship between the analyst's employer, usually an investment house, and the client company. The investment house's interests towards their clients are related not only to the service that the equity analysts provide, the investment house usually tries to establish a long term relationship with the client aimed at providing a multiplicity of investment services. Favourable reports and buy recommendations may, without any doubt, help the long term business relationship between the investment house and the client. De Heer et al. (2001) mention the theory expressed in Olson (1996) as an additional explanation for the bias. Olson (1996) believes that human desire for consensus leads to herding behaviour among equity analysts and the more the forecasts are complicated, as in the case of cyclical companies, the greater is the probability that herding behaviour can take place.

By focusing on the strategic side, Navarro (2005) studies the actions that a single company could take when facing a business cycle. He explains that cyclicality can be viewed as an opportunity rather than a threat from a strategic point of view. He analyzed a sample of 180 companies across 2001 recession, by interviewing their top management. The results he provides show how a set of business-cycle related capabilities and resources could allow the organization to create value and even take advantage over its competitors during a downturn of the economy. He names five characteristics a firm should have to manage business cycles and he provides his work with some examples from real life. These capabilities and resources refer to the degree of business cycle literacy of firm management, that should include Macroeconomic Education, improved by training programs, aptitude and talent and practical experiences in managing previous business cycles. Furthermore the company has to develop forecasting tools in order to enhance predictability and sustainability of its results. The organizational structure of the company should be flexible enough in order to quickly adapt to the new information provided by the forecasts. Finally the company has to apply a set of cycle-sensitive management principles related to almost all the divisions of the company. For instance, the 'Marketing & Pricing' department has to build the brand market share through countercyclical advertising, it has to change the product mix in order to fit the business cycle "seasons", etc. The 'Risk Management' department has to identify the right diversification and outsourcing strategies in order to hedge risks, it

can use derivatives instruments to hedge specific risks of the company, etc. The 'Human Resources' department has to keep high skilled resources within the company during the downturn of the economy and has to carry out 'cherry pick' strategies before the recovering of the firm, etc. Figure n.4 provides a representation of the strategies a firm should put in place in order to properly manage business cycles (from Navarro, 2005).

Figure 4 – Well-timed Strategies and Tactics of the Master Cyclist Executive.
From Navarro P., "The Well-Timed Strategy Managing the Business Cycle", California Management Review, Vol. 48, N.1, Fall 2005.



2.2.2 Multiples approach in corporate valuation

Since the quantitative analysis of this work is carried out by a multiples analysis, this paragraph provides a short overview of the literature on the subject.

Despite their widespread use in practice, compared to the DCF or RIV analysis, standard textbooks on valuation reserve little space to multiples valuation[5].

Damodaran (2006) is the one who puts the most weight on the explanation of the characteristics and determinants of various multiples, enhanced by utilizing descriptive statistics for different countries and industries, and over the time. The books from Massari and Zanetti (2004) and Copeland, Koller and Murrin (2005) are other sources which help to better understand the drivers underlying assets and equity multiples. Furthermore they provide readers with some insights about the most common adjustments needed to build a clean set of multiples.

Zara (2005), again Massari and Zanetti (2004) and Arzac (2005) concentrate on development of criteria for the identification of comparable firms. In an ideal world, comparable firms have the same operating and financial characteristics as the firm object of valuation.

Zara (2005) focuses on accounting and data management aspects when selecting comparable firms, Massari and Zanetti (2004) describe all steps to be taken when applying valuation with multiples and finally Arzac (2005) presents an alternative way to eventually obtain appropriate multiplies for all firms in the same industry and with similar size. He shows how to adjust observed P/E multiples for differences in leverage and growth.

Multiples are widely studied in academic research, just to mention some studies: several papers investigate the general valuation accuracy of valuation with multiples. Kaplan and Ruback (1995, 1996), apply a DCF and multiples valuation (the EV/EBITDA multiple) to a sample of leveraged transaction and conclude that multiples approach lead to similar results in terms of accuracy.

Liu, Nissan and Thomas (2000) investigate the performance of multiples for the U.S. equity market and find that multiples based on earnings forecasts explain prices reasonably well for a large fraction of firms. Furthermore they compare their results to the RIV performance model and they conclude that valuation with multiples seems to be more accurate. As far as the comparison between different types of multiples is concerned, Liu, Nissim and Thomas (2002, 2005a and 2005b) test the ability of equity multiples to approximate stock prices within an international setting. By analyzing a sample of companies scattered over ten countries, they find that trailing multiples based on earnings perform best, those based on sales perform worst and multiples based on operating cash flow and dividends have shown intermediate performance. Moving from trailing to forward multiples valuation accuracy improves, with the greatest improvement being observed for earnings. Kim and Ritter (1999) reach

[5] E.g., Damodaran (2006); Copeland, Koller and Murrin (2005); Arzac (2005); Massari and Zanetti (2004); Zara (2005).

similar conclusions (within an IPO price analysis) about the comparison between trailing and forwards multiples. Lie and Lie (2002), in line with previous studies, highlight superior performance of forward-looking P/E multiples compared to all other multiples. They also show that for trailing multiples, book values yield more accurate predictions than measures from the income statement (i.e. sales, EBITDA, EBIT and earnings). This result conflicts with Liu, Nissim and Thomas (2002a) and Kim and Ritter (1999), where performance of book value multiples is found to be relatively poor. Taken all together, empirical findings in favour of forward-looking multiples are significant. From the results reported above derives my choice of not including sales and book values multiples in my analysis.

Moving to the identification of comparable companies, several studies confirm my choice of identifying comparable firms within the same industry to which the company being valued belongs. Among the others, Alford (1992) uses P/E multiples to test the effects of different methods of identifying comparables based on industry membership and proxies for growth and risk on the precision of valuation estimates. He shows that, while valuation accuracy increases when the industry fineness definition used to identify comparable firms is narrowed from a broad one-digit Standard Industrial Classification (SIC) code to a two-digits or three-digits SIC codes, there are no further improvements when four-digit SIC codes are considered. He also finds that adding controls for earnings growth, leverage, and size does not significantly reduce valuation errors. Boatsman and Baskin (1981) compare the valuation results where comparables companies are chosen randomly with the results of a valuation where comparables are chosen among firms from the same industry of the company being valued. They reach the same conclusion as Alford (1992).

Other studies (Bhojraj and Lee, 2002; Bhojraj, Lee and Ng, 2003; Cheng and McNamara, 2000; and Herrman and Ritcher, 2003) present different evidences from the studies mentioned above. They found that factor in line with corporate finance theory (and related to growth), profitability and risk for the identification of an appropriate peer group work better than industry classification methods (through SIC codes).

Finally, Chopra (1998) finds that, for a samples of US companies, analysts' EPS forecasts are on average 11% higher than actual earnings at the start of the year. The forecasts are revised progressively downward until the end of the year. Clayman and Schwartz (1994), Dreman and Berry (1995), and Olsen (1996) reach similar conclusions in their studies. As I will show in the quantitative part of this work, also my sample of EPS forecasts is subjected to the same bias.

2.3 Theory

This section provides an overview of the main theories about business cycles and corporate valuation (with a focus on valuation by multiples). The first paragraph reports a short overview of all main theories related to business cycles literature; the second paragraph focuses on the works of Meitner (2004)[6] and Massari, Zanetti (2005)[7] and gives some details about the theory of valuation by multiples.

2.3.1 Business cycle theory

In this paragraph I report a short overview of the main theories related to the study of the business cycles, from the oldest (Keynes 1936) to the most recent ones (Externalities Theory of 1990s).

First of all, I provide some general concepts about business cycles. An "inpulse" is an event that starts cycle states. It is what initially moves the economy away from a historical trend, while the "propagation mechanisms" is the internal adjustment process in the economy that causes the impulse to spread to the economy as a whole. On one hand, "recession" generally starts when investment in new capital starts to slow down, on the other hand "expansion" often starts when investments in new capital stock start to speed up. Furthermore, unplanned changes in business inventories are often early signals of a change of direction in the business cycle (Noam, 2004).

First I provide a short overview about three Aggregate – Demand based theories: the Keynesian Theory, the Monetarist Theory and the Rational Expectations Theories; and one Aggregate – Supply based theory: the Real Business Cycle Theory (RBC).

The Keynesian Theory (Keynes 1936, Hicks 1950, Tobin 1975) explains demand cyclicality as caused by the instable behaviour of market participants. Cyclicality is mainly driven by investors psychology on the demand side. The economic fluctuations come from expectations volatility that changes planned investment spending. In some cases expectations become self-fulfilling since aggregate demand seems to be led by the effect that consumer spending indicators have on the demand itself. This phenomenon was called by Keynes as "animal spirits" and more recently by Greenspan (Shiller, 2001) as "irrational exuberance".

The Monetarist View (Friedrich von Hayek 1993 and 1950, and Friedman 1982) assumes that cyclicality is caused by fluctuations in money supply. Public authorities can increase money supply which leads to a fall of interest rates, therefore real money balances increase and the exchange rate

[6] Meitner M., 2003, "Option-style multi-factor comparable company valuation for practical use", ZEW Discussion Papers.

[7] Massari M., Zanetti L., *Valutazione Finanziaria*, McGraw-Hill, 2004.

loses value. The exchange rate loss in value leads to an increase in investments and exports, consumers spend more on durable goods, and these initial changes in expenditures have a multiplier effect and an expansion begins. Decreases in money supply have similar effects in the opposite direction – i.e. starts a contraction. Monetarists believe that cycles result from errors made by monetary authorities when answering to economic conditions. When a central bank acts by modifying interests rates with wrong monetary policies, it sends an incorrect signal to the market that leads to a wrong answer by market players, that in turn causes instability and potential cyclicality (Fischer 1997). Noam (2004) notices that this does not seem to be the right explanation for cyclicality, since, at least for the telecom industry, even for periods where interest rates were moderated, they did not support a faster return to the upper side of the cycle in the industry.

The last Aggregate – Demand based theory is based on "rational expectations", which are forecasts based on all the available relevant information. They are not necessarily "right", they are just based on all the info and therefore "unbiased". One of the theories based on rational expectations is the New Keynesian Theory, which affirms that an increase in consumption, pushed by an increase in aggregated demand, implies a greater increase in investments spending. In the opinion of the New Keynesian Theory advocates, the time to reach the peak of the cycle is shorter since the investment spending in this model has a greater effect than the effect it has in the classical Keynesian Model. Therefore the Aggregated- Demand increases faster. Of course, on the other side, if demand decreases, the cycle reaches the trough point faster. Hicks (1950) noticed that production activity has some limits: the lower limit of the cycle, is represented by the least amount of investment spending that is always afforded (e.g. the governments expenses for the maintenance of the public infrastructures), therefore a minimum income is always present; the upper limit is reached when the productivity is totally exploited.

An Aggregated – Supply based theory, is supported by Prescott (1983) and is named Real Business Cycle Theory (RBC). This theory affirms that cycles are caused by random shocks that impact productivity. For example the event of the 11th September can be considered as a negative shock, while the internet boom can be considered as a positive shock. Shocks to be considered under the RBC theory should be exogenous, technology-oriented and should affect productivity. In the view of this theory, output affects consumption, and not the other way round as stated in previous theories (Espinosa, Vega and Guo, 2001). Also, in the view of this theory, neither consumer psychology nor government actions can influence cyclicality (based on random shocks).

The Lag and Accelerator Theory (Samuelson, 1939) affirms that when there is a significant lag between the investments to increase the productive capacity of a company and the effective delivery of the capacity expansion, shifts in the delivery of production capacity can generate waves of investment spending. For some industries, as airplane and telecommunications, where investments take a long time to be effective, is more likely that Lag and Accelerator Theory effects could take place.

The "Austrian Theory" (Mises, 1928; Hayek 1993 and 1990; Habelrler 1937; Bohm and Bawerk 1895; Wicksell 1936; and Schumpter 1939) is focused on the overcapacity of the industry. In the view of its supporters, overcapacity should lead to an adjustment period that eventually ends up in a downturn. Causes that lead to overcapacity are diverse (e.g. empire building ambitions, excessive bank lending), but the origin is the same: a continuative expansive monetary policy that increases too much money supply, lowers interest rates and leads to phenomena of "malinvestment" (i.e. bad allocation of resources). At a certain point the bad investments on the market lead to a correction that implies a new recession. The theory received more than one criticisms, mainly related to the following aspects: the lack of an explanation of the reasons that would lead companies to systematically overestimate their output market and the meaning of "overcapacity" word when related to macro-economic rather than to specific industry factors.

Last, but not least, the Externalities Theory (Farmer and Guo 1994), is more suitable for industries where externalities plays a relevant role (e.g. telecommunication). According to their supporters, externalities exacerbate company growth when it is reaching the peak of the cycle, while exacerbate the decline when the company is reaching the trough point. If companies could coordinate their actions, they could probably lower the effects of externalities, but since companies work almost always in a competitive setting, such a cooperation is not considered as a possible solution.

The identification of the theory that would be the more appropriate for the explanation of the cyclicality that affects the sample of cyclical companies studied in this work is beyond the scope of this master thesis, nevertheless the theories above are of extreme importance to understand possible factors affecting the extent of the phenomenon.

2.3.2.Valuation by multiples

Following the work from Meitner (2004), the theoretical foundation of company valuation is based on three different approaches:

1) With the first approach, the value of the company is estimated directly on the basis of its expected cash flow. In some circumstances cash flow can be substituted by other forms of performance, e.g Dividends or Earnings. Models of this type are the discounted cash flow model (DCF), the dividend discount model (DDM) and the residual income model (RIM).
2) Under the second approach, the valuation of a company is based on how the market values similar companies. In this case, no explicit forecasts of cash flow are needed, however it is of primary importance the capital markets' quality: it requires the condition of efficient markets and the existence of comparables companies. Unfortunately markets are usually considered not efficient; for this reason, DCF approach is considered the more accurate approach. Models

of this type are: valuation with multiples, comparable company valuation (CCV), relative valuation approach.

3) The third approach is suitable for the valuation of assets that show option characteristics (called real options), for which the value is computed using option pricing theory. Advantage of this approach is that it takes into consideration the management flexibility to take advantage of future strategic opportunities or to temporarily shut down/suspend the business. However, despite its advantages, this kind of method is usually associated with a big quantity of analysis and calculations.

The method I used in my analysis is the valuation with multiples, one of the methods included in the second group of methodologies.

2.3.2.a *Introduction*

Valuation with multiples is the method adopted in this work to value both samples of companies: cyclical industries (Chemicals, Electronics, Primary Metals, etc.) and non-cyclical industries (Tobacco, Food, Utilities, etc.). Once the value of the two samples of companies is estimated, it is compared with the observed value on the market in order to show that the sample of cyclical companies yields to a greater misvaluation phenomenon compared to the sample of non-cyclical ones.

Valuation with multiples estimate the value of a company on the basis of the share price referred to some comparable companies; therefore it requires the efficient market assumption. DCF is the most diffused approach among practitioners because it does not require the assumption mentioned above. The underlying concept of market-based valuation is the law of one price, which states that in an efficient market – at least on average –, similar assets should trade at similar prices (Esty, 2000). The law of one price appeals from a methodological perspective. In practice, however, the concept embodies the problem that even if the market is efficient, similar firms are hardly identified or do not always exist. Even so, valuation with multiples is widely used in practice for different reasons, first of all, if properly executed, this kind of analysis can represent a quick supportive analysis to the traditional DCF valuation; it can help to explain differences among companies performance and, more important, it can give more insights about the drivers of the performance itself. By applying multiples to current or earnings forecasts, one can obtain two results: the present value of the enterprise (or of its equity), or the estimation of the terminal value (when applying a DCF analysis).

Besides the efficient market assumption, a basic assumption underlying multiples approach is the comparability of companies used in the valuation with the company being valued.

Ohlson (2006) adds two reasons for the success of multiples valuation in corporate finance: the first reason is that terminal value estimates are an important part of the total value estimated (for high growth companies it can reach the 80-90% of the total value), and since it is difficult to estimate any financial figure of the company (included cash flow) beyond 3 to 5 years horizon, estimation by multiples would be more appropriate in this case. Secondly, multiples are easy to compare, communicate, and negotiate. Therefore investors usually prefer multiples models to complex spreadsheet-based valuation models.

2.3.2.b *Procedure*

From a computational point of view, valuation with multiples proceeds in two steps: in the first step, the multiple of a comparable company or the average (or median) value of the multiples of a set of comparable companies have to be estimated as follows:

$$\text{Multiple} = \text{median OR average}_{j \in I}\left\{\frac{FF1_{j,t}}{FF2_{j,T}}\right\}$$

Where FF1j,t is the first financial figure of comparable (firm j) and FF2j,T is the second financial figure of the same comparable being part of the peer group (I), e.g. if we want to compute the well known price to earnings multiple (P/E), we have to compute the ratio of the stock price (which identifies FF1j,t) over the earnings per share of the same company (which identifies FF2j,T).

In the second step the multiple obtained for a single company (of the peer group) as explained before (or an average/median of multiples for a set of comparable companies) is multiplied for the respective current or forecast financial figure of the target company (FF2x,T). In the P/E example: the ratio is multiplied by the earnings per share of target company, to obtain estimates of its share price, as follow:

$$\text{Value Target} = \text{Multiple x } FF2_{x,T}$$

Multiples are part of two broad categories: asset based multiples and equity based multiples. In order to include both categories in this analysis, the following assets based multiples are computed:

$$\text{Enterprise Value to EBIT}\left(\frac{EV}{EBIT}\right) = \frac{\text{Book value of Assets} - \text{Book Value of Equity} + \text{Market Value of Equity}}{EBIT}$$

$$\text{Enterprise Value to EBITDA}\left(\frac{\text{EV}}{\text{EBITDA}}\right) = \frac{\text{Book value of Assets} - \text{Book Value of Equity} + \text{Market Value of Equity}}{\text{EBITDA}}$$

And the following equity based multiple:

$$\text{Price to Earning}\left(\frac{\text{P}}{\text{E}}\right) = \frac{\text{Stock Price}}{\text{Earnings per share}}$$

Furthermore the following version of EV/EBIT and EV/EBITDA are computed:

$$\text{Adjusted} - \text{Enterprise Value to EBIT}\left(\frac{\text{EV}}{\text{EBIT}}\right) = \frac{(\text{Book value of Assets} - \text{Book Value of Equity} + \text{Market Value of Equity}) - \text{Cash and Cash Equivalents}}{\text{EBIT}}$$

$$\text{Adjusted} - \text{Enterprise Value to EBITDA}\left(\frac{\text{EV}}{\text{EBITDA}}\right) = \frac{(\text{Book value of Assets} - \text{Book Value of Equity} + \text{Market Value of Equity}) - \text{Cash and Cash Equivalents}}{\text{EBITDA}}$$

The reason behind the usage of the adjusted-EV is that cash and cash equivalents should have the market value equal to the book value, therefore it should be useless to value these items by multiples. Second, since companies with a great deal of cash will be undervalued relative to companies with little cash, by excluding cash and cash equivalents the use of adjusted-EV should avoid the distortion (Lie and Lie, 2002).

The EV/EBIT, the EV/EBITDA and the P/E multiples represent the scope of my theoretical overview in the following paragraphs.

Depending on how the ratio is built, we can compare the current stock price with the accounting results of the last financial disclosure, obtaining the “current multiples”; the current stock price with the accounting data referred to the last 12 months, obtaining the “trailing multiples” and, finally, the current stock price with a forecast of the accounting data obtaining in this way the “forward multiples”.

The following scheme shows how to compute P/E multiple for the three kinds of procedures:

$$(a)\ \text{Current multiple} = \frac{P_0}{E_{T0}} \qquad (b)\ \text{Trailing multiple} = \frac{P_0}{E_{LTM}} \qquad (c)\ \text{Forward multiple} = \frac{P_0}{E_{T1}}$$

Where E_{T0} are the earnings per share (EPS) of the last accounting data disclosed (a); E_{LTM} are the EPS of the last twelve months while E_{T1} (b) are the EPS forecasted for the following period (c).

Forward multiples are based on the business plan of the company, for this reason they are more suitable when the company current accounting data are not a reliable measure of the ordinary firm business activity (for instance because of temporary company crisis, restructuring activity, etc.).

Multiples can be derived from two kinds of sources:

1) market capitalization of public peer companies, in this case they are called "stock market multiples";

2) previous transaction's prices of private or public peer companies, in this case they are called "deal multiples" (or "transaction multiples").

In this work only stock market multiple are considered.

Massari and Zanetti (2005) suggest that, in normal market conditions, stock market multiples generate stand alone values, while deal multiples, generate likely "market prices of the company". When using deal multiples, analysts have to correct the value obtained by subtracting the acquisition premium, the extra-price the acquirer paid (due to the acquisition benefits) for buying the company in excess of the value of the same company on the market (stand-a-lone value).

2.2.2.i.c Comparables Selection

When applying multiples valuation approach, three fundamental steps should be applied:

- Selection of comparables, on the basis of the characteristics and the size of the company;
- Computation of multiples for the peer group after having done some adjustments;
- Choice of the average the multiples within the multiples computed for the peer group.

The first step when valuing a company with multiples, implies the selection of the peer group. One basic check to do when selecting the peer group is to be sure there is homogeneity among companies in the set, in terms of accounting practices and data management. In order to obtain homogeneity in the selection, the following basic rules should apply (Zara, 2005):

- absence of significant extraordinary items;
- absence of non-operating investments or investments not pertaining to the firms' core business;
- absence of minority interests (in case of company groups);
- uniformity of tax treatment.

Once basic checks about accounting and data are done, in order to select the proper multiples, Copeland, Koller and Murrin (2005) suggest to pick companies with similar prospects in terms of value drivers (growth and ROIC) and coming from the same industry of the company being valued. In line with these recommendations, they suggest to take in consideration other figures than earnings when in the peer group some companies have negative earnings, since is not correct to value companies with good prospects through companies with bad prospects. Arzac (2005) confirms that companies in the same peer group should have similar expected growth, risk and, if possible, should be in the same business cycle of the company being valued. Unfortunately companies have usually different growth prospect and risk profiles. Furthermore there is no certainty about which is the right performance measure to use when comparing companies (Massari and Zanetti, 2005).

One of the advantages often recognized to multiples over the DCF method, is that analysts do not have to make subjective estimates, but this is partially true; as we have seen from the above paragraphs, the selection of comparables leads to a great degree of subjectivity as the extent to which companies are comparable is limited (Massari and Zanetti, 2005).

2.3.2.c Analysis

Once the set of comparables companies have been selected, one can compute the multiples for each company. When choosing between trailing multiples and forecast multiples, Copeland et al. (2005) suggest to use forecasted multiples since they are closer to the principles of valuation (they are based on the value of future cash flow). Empirical research supports their view: Liu, Nissan, and Thomas (2002) found that two years forecast earnings work even better than one year forecasts and Kim Ritter (1999) found greater accuracy in valuations by multiples when forecasts are applied.

Finally, the average or the median of the peer multiples represent the value that has to be multiplied for the corresponding value of the target company (to be valued). Copeland et al. (2005) suggest to adapt the median (or harmonic mean[8]) instead of the average in order to avoid outliers that could lead to major distortions in the valuation. For this reason, I compute both average and the median multiples of my set of comparables.

An important step in multiples analysis is the choice of the right multiple for the valuation. As stated in previous paragraph, in the theoretical illustration that follows I focus on the following multiples: current and forward P/E of the equity type; current EV/EBITDA and current EV/EBIT of the asset type.

2.3.2.c.1 Price-to-Earnings multiple (P/E)

P/E ratio indicates if a company can be defined "cheap" or "dear". An higher P/E ratio means that for that company, each unit of income is more expensive.

Although widely used by practitioners, Price to Earnings ratio (P/E) has, in the opinion of Copeland et al. (2005), two important disadvantages. First, it is heavily affected by the capital structure of the company and second, it is calculated after non-operating gains and losses, therefore a non-operating loss for example, can significantly lower earnings, causing P/E to be very high without a corresponding effect on the value of the firm.

Regarding the first problem, the following formula from Copeland et al. (2005) shows the relation between P/E and the capital structure of the company:

$$\frac{P}{E} = \overline{K} + \frac{\overline{K} - PE_u}{\left(\frac{D}{V}\right)(k_d)(PE_u) - 1} \qquad \text{given } \overline{K} = \frac{1}{k_d}$$

Where k_d is the cost of debt and D/V is the ratio of the debt to value. The formula shows that for companies with large unlevered P/E (i.e. companies with major opportunities for future value creation), P/E increases with leverage, whereas, for companies with small unlevered P/E, P/E drops as leverage rises.

In the opinion of Copeland et. al (2005) a better alternative to P/E multiple, is the Enterprise Value (the value of equity and net debt) to Earning before Interests, Taxes and Amortization (EBITA). This

[8] Baker and Ruback (1999) show that harmonic mean leads to superior results.

ratio theoretically is not affected by capital structure (assuming no taxes and no distress costs), however, in practice, Enterprise Value is higher for companies with a better capital structure (since Enterprise Value's value drivers are ROIC, growth and the weighted average cost of capital).

A second problem of P/E ratio is that it includes non operating earnings, that usually are one-time items leading to distorted valuation. This problem is common to the EV/EBITA multiple as well, it contains, for example, costs related to the operating leasing, while Enterprise Value does not contain the value of lease-base debt. Therefore Copeland and al. (2005) suggest to adjust both Enterprise Value and the EBITA for non operating items. Besides operational leasing, they also suggest to adjust Enterprise Value and EBITA for the effects of: excess cash (and other non-operating assets), employees' stock options and pensions.

Arzac (2005) adds another drawback to the use of P/E: its sensitivity for differences in accounting policies (e.g. depreciation and amortization depend on the usage of purchase or pooling methods of accounting).

Following Lee (2007), P/E ratio can be different between two companies of the same line of business because of the following factors:

- Better growth prospects for one company compared to the other;
- Higher quality/less risky earnings: investors are keen to pay higher prices (relative to profits) for companies when they perceive that company's profits are more safe. Their feeling thought depends on a series of characteristics of the company, e.g. record of management, position in the market compared to competitors;
- Recovery prospects;
- Other factors affecting shares price of the company being valued (e.g. possible takeovers);
- Overvaluation/undervaluation of the company share price.

2.3.2.c.2 Enterprise Value to EBIT (EV/EBIT)

A possible alternative to P/E and EV/EBIT is the EV/EBITDA, which is widely used by analysts.

Following Massari, Zanetti (2005), the Enterprise Value can be obtained as the present value of all the cash flow of the company discounted back at the company weighted average cost of capital (WACC). If it is assumed growth to be equal to zero and depreciation to be equal to the new capital

investments and zero variation in the net working capital item, EBIT can represent the operational cash flow. Therefore we can consider the following formula to be true:

$$EV_0 = \frac{EBIT_0 x(1 - t_c)}{wacc}$$

and dividing both sides by EBIT:

$$\frac{EV_0}{EBIT_0} = \frac{1 - t_c}{wacc}$$

The formula above implies that, for a set companies, with the same tax rate (t_c), values assumed by EBIT multiples depend on the weighted cost of capital. Therefore the difference in values observed can be related to the following aspects:

- differences in operating risk of the companies; given the imperfect comparability among companies;
- difference in capital structure of the company (with a growing multiple for a growing leverage).

If it is assumed a constant growth-rate, the formula above (after some adjustments) becomes:

$$\frac{EV_0}{EBIT_1} = \frac{(1 - t_c) \text{ x payout}}{wacc - g}$$

And shows the implied relations underlying the EBIT multiple in presence of growth.

More in detail, the multiple can be split in the following formula:

$$\frac{EV_0}{EBIT_1} = \frac{(1 - t_c)}{wacc} + \frac{(ROI - wacc)}{wacc} \text{ x } \frac{(1 - payout) \text{ x } (1 - t_c)}{wacc - ROI \text{ x } (1 - payout)}$$

That gives a direct illustration of multiple's drivers:

- the first expression represents the basic multiple as in absence of growth;
- the second expression represents the excess return related to the cost of capital;
- the third expression represents a proxy for the reinvestment ratio.

2.3.2.c.3 Enterprise Value to EBITDA (EV/EBITDA)

EBITDA multiples are obtained by dividing the Enterprise Value of comparables companies by their EBITDA and when applied to the target company EBITDA, it yields an estimated value of its Enterprise Value. To obtain the Equity value from the Enterprise Value, one has to subtract from the value obtained: net debt, minority interests and any preference shares.

The multiple can be split as follow:

$$\frac{EV_0}{EBITDA_0} = \frac{1}{wacc} - \frac{T_0/EBITDA_0}{wacc} \times \frac{I_0/EBITDA_0}{wacc}$$

where T_0 are taxes on operating results, therefore T_0 = EBIT0 x $(1-t_c)$ and I_0 are "normal" investments.

The first part of the formula implies that multiple is related to the operating risk and the leverage of the company. The seconds and third elements show the effect of tax and normal investments on EBITDA multiple.

The greater advantage of this multiple is that depreciation is excluded from the analysis, since it is thought as a noncash expense, reflecting sunk costs and not future investments. With the EBITDA multiple the analysis is based on the cash flow generated by operating activity (the EBITDA) and on the part of the cash flow selected to be reinvested.

EV/EBITDA multiple is very diffused among practitioners, since it includes at the numerator the value of the company and, at the denominator, a proxy for the company cash generation potential,therefore it represents a kind of "payback" of a transaction. The explanatory value of this multiple is stronger for sectors with high capital intensity, where differences between EBIT, EBITDA and vertical integration among companies within the sector are relevant.

The multiple is employed as well when valuing companies with strong component of intangible assets (e.g. goodwill, brands) and consequent amortization items, which have no financial meaning.

2.3.2.d *Summary*

To conclude, the following table gives a summary of "pros" and "cons" of the three multiples adopted in this analysis:

Table 1 - Pros and cons of multiples.
Pros and cons of EV/EBITDA, EV/EBIT and P/E multiples from "The investment banker's handbook" - Lehman Brothers (2008)

	PROS	CONS
EV/EBITDA	• Incorporates profitability • Most business are EBITDA positive so widening the universe • Ignore the most significant accounting differences arising from goodwill and other intangible assets • Relatively limited exposure to accounting differences	• Ignore depreciation/CAPEX • Ignore Tax regime and Tax profiles • Does not take into account varying EBITDA growth rates • Inconsistency of treatment within EBITDA of joint venture and other unconsolidated affiliates within different reporting environments • Other accounting differences such as revenue recongnition, capitalisation policies, finance vs. operating leases
EV/EBIT	• Incorporates profitability • Useful for capital intensive businesses where depreciation is a true economic costs • Good for companies within the same reporting environment where accounting differences are minimised	• Depreciation/amortization policies may differ • Ignores Tax regimes and tax profiles • Does not take into account varying EBIT growth rates • Inconsistency of treatment within EBIT of joint venture and other unconsolidated affiliates within different reporting environments • Other accounting differences such as revenue recognition, capitalisation policies, finance vs. operating leases • Depends on corporate structure • Accounting policies have a significant impact on earnings
P/E	• Widely used in industries with high visibility of earnings • Widely understood • Quick and easy calculation • Useful to check DCF exit assumptions	• Depends on corporate structure • Accounting policies have a significant impact on earnings

2.4 Hypothesis

Although, so far, implications of cyclicality on corporate valuations have not been empirically tested, different studies (Copeland et al., 2005; De Heer, Koller, Schauten and Steenbeek, 2001) presume that a cyclical behaviour of earnings should leads to higher difficulties when trying to assess the value of a company. Following those studies and common intuition, I expect (and I test for it through a quantitative analysis) valuation errors to be larger for cyclical companies than for non cyclical ones.

Some papers highlight that the accuracy increases with companies' size (Alford, 1992; Lie and Lie (2002). Lie and Lie (2002) believes that the reason for a better accuracy of valuation of bigger firms can derive from the number and nature of projects in which those kind of companies are involved. Large companies are involved simultaneously on a large number of projects; the value of each of them fluctuates continuously, but taken altogether they offset each others on average, implying a relatively stable value of cash inflow. Following this theory, I expect less accuracy when valuing cyclical companies, given that their earnings' path is more erratic and similar to the small companies' path of earnings. The path of earnings of non-cyclical companies is supposed to be more stable and predictable like the one of big companies, and in accordance to Lie and Lie (2002) findings, it should lead to more accurate valuations. For this reason I expect valuation errors of cyclical and small companies to be larger.

Finally, since, in this study, I recognize cyclicality as a state determined by a higher volatility of the company earnings, I test for the influence of company earnings volatility on valuation errors. In other words I expect volatility to be one of the factors affecting the accuracy of valuations. Furthermore as reported in Copeland et al. (2005), there is a positive relation between earnings volatility of the company and the shares price volatility, for this reason I expect volatility of the stock index to be a possible factor affecting the accuracy of valuation.

Summing up, I expect earnings cyclicality, size and volatility, to be the three main factors affecting the accuracy of valuations when dealing with cyclical companies.

CHAPTER 3 Research methodology

3.1 Introduction

Valuation with multiples is one of the methods used by practitioners to value companies as an alternative to the traditional Discounted Cash Flow (DCF) method. Valuation with multiples consists of computing some multiples (ratios of specific financial figures) for a set of companies (peer group) and then finding the implied value of the target company (objective of the valuation) by applying these ratios to the respective financial figures of the target company.

The method seems to be straightforward, but the large variety of multiples makes difficult to choose the right one. In other words, there is no consensus on which multiple performs best. Referring to related literature, I have followed the subsequent guidelines: Kim and Ritter (1999) found that forecast Price/Earnings multiples perform better than historical ones (in a IPO contest), therefore I have computed both current and forward P/E multiple. In addition to these multiples, I have used some asset multiples (the EV/EBIT and the EV/EBITDA multiples), that seem to provide a better valuation compared to sales multiples and equity multiples (Lie and Lie, 2002).

In order to demonstrate that business cyclicality decreases the accuracy of valuation by multiples, in the quantitative section of this work I value two samples of companies: one sample with companies drawn from typical cyclical industries and another sample with companies drawn from non-cyclical industries. Once the estimation of the companies is assessed, the values obtained from the estimation are compared with the observed values on the market in order to understand which type of companies cause the larger valuation errors.

3.2 Identification of cyclical and non-cyclical industries

The first step required to the analysis is to identify cyclical industries versus non-cyclical ones in order to derive the two samples of companies. Boudoukh et al.[9], assess the cyclicality of each sector by linking the industrial production growth rate of the industry to the aggregate industrial production growth rate. In other words:

1. industrial production growth rates of non cyclical sectors have low correlation with the aggregate industrial production growth rate;

[9] Industry Returns and the Fisher Effect, 1994

2. industrial production growth rates of cyclical sectors have high correlation with the aggregate industrial production growth rate.

From the analysis of returns and monthly real industrial production rate for a sample of US companies for the period 1953 to 1990, Boudoukh et al. (1994) produced the output in table n.2.

Table 2 – Correlation between production growth in each industry and the aggregate output growth. From Boudoukh, J.M., Richardson, M., Whitelaw, R.F., (1994); "Industry Returns and the Fisher Effect", Journal of Finance, Vol. XLIX, no. 5.

Industry	Aggregate Output Correlation	(Std. Error)
Food and Beverage *(**)*	**0,333**	**(0.080)**
Tobacco *(**)*	**0,114**	**(0.082)**
Utilities *(**)*	**0,360**	**(0.051)**
Printing and Publishing	**0,564**	**(0.065)**
Petroleum Products	**0,382**	**(0.067)**
Leather	**0,395**	**(0.060)**
Instruments	**0,699**	**(0.053)**
Mining	**0,521**	**(0.074)**
Lumber *(**)*	**0,377**	**(0.073)**
Apparel	**0,620**	**(0.078)**
Paper	**0,690**	**(0.059)**
Chemicals *(*)*	**0,792**	**(0.040)**
Miscellaneous Manufacturing	**0,682**	**(0.048)**
Clay, Glass, and Store	**0,739**	**(0.044)**
Furniture	**0,747**	**(0.051)**
Textiles	**0,615**	**(0.078)**
Nonelectrical Machinery	**0,708**	**(0.051)**
Electrical Machinery*(*)*	**0,802**	**(0.049)**
Metal Products *(*)*	**0,917**	**(0.019)**
Rubber and Plastics	**0,649**	**(0.093)**
Transportation Equipment	**0,746**	**(0.047)**
Primary Metals *(*)*	**0,763**	**(0.034)**

(*) industry included in the 'cyclical' sample

(**) industry included in the 'non - cyclical' sample

The four industries that have the highest correlation between their production growth rate and the aggregate output growth rate are supposed to be more prone to cyclicality while the four industries with the lowest correlation are supposed to be less cyclical. The previous considerations have led to the selection of the industries reported in table n.3 (in the next page).

Table 3 – Industries selected for the analysis.

SIC code	Cyclical Sectors:	SIC code	Non-cyclical sectors:
28	**Chemicals and allied products**	**20**	**Food and kindred products**
36	**Electronic and other electric equipment**	**24**	**Lumber and wood products**
33	**Primary metals industry**	**21**	**Tobacco products**
37	**Transportation equipment**	**49**	**Utilities (Electric, Gas and Sanitary Services)**

Boudoukh et al. (1994) findings are confirmed by Berman and Pfleeger (1997) who identified cyclical industries by studying the correlation between industry employment and GDP: the higher the

correlation, the higher the vulnerability of the industry to the economic swings. They identify the cyclical industries in table n.4.

Table 4 – Industries with the most business cycle prone employment.
From Berman J., Pfleeger J., 1997. "Which industries are sensitive to business cycles?", Monthly Labour Review, 120 (2), 19-25.

Industry Employment most correlated with business cycle fluctuations
1) Household furniture
2) Miscellaneous plastics products, not elsewhere classified
3) Personnel supply services
4) Plumbing and nonelectric heating equipment
5) Stone, clay, and miscellaneous mineral products
6) Electric lighting and wiring equipment
7) Metal coating, engraving, and allied services
8) Concrete, gypsum, and plaster products
9) Partitions and fixtures
10) Cutely, handtools, and hardware

Almost all the sectors in the table above are obviously related to the cyclical industries found by Boudoukh et al. (1994), e.g. "Electric lighting and wiring equipment" can be related to "Electronic and other electric equipment" (SIC Code 36) while "Metal coating, engraving, and allied services" and "Stone, clay, and miscellaneous mineral products" can be related to the "Primary metals industry" (SIC Code 33), etc.

After selecting the industries, I have included in my sample all active/non active companies which are identified by the SIC Code of each industry in table n.3, for the period 1995 to 2007, listed on the London Stock Exchange. This process led to the analysis and selection of 174 companies, 101 from the four cyclical industries and 73 from the non-cyclical ones.

3.3 Data

The companies in the sample are active and non active firms whose data refer to the interval 1995 to 2007. The accounting data are drawn from the Thomson One Banker Database. All the financial data are referred to the fiscal years from 1995 to 2007. In order to compute the forward multiples, in addition to the accounting data, I need the forecasts for the EPS, therefore data include the EPS consensus forecast for each year (computed at December 31st), available in Thomson One Banker, but obtained from the I/B/E/S Global Aggregate Database.

Table n.5 gives detailed information about the number of multiples computed in the analysis. Multiples computed for cyclical companies are 5,205, while multiples compute for non-cyclical

companies are 4,482, for a total of 9,686 actual multiples. The difference in the number of companies between the two samples of companies analyzed for each type of industry is related to the availability of data and the number of companies belonging to a certain industry (e.g. SIC code n.21 includes only two companies for the Tobacco industry). Furthermore, as in Lie and Lie (2002), observations coming from years where companies had negative earnings are excluded, since they are meaningless.

Table 5 - Number of multiples for each industry and for each type of multiple. AVG is n. of multiples obtained by averaging the comparables multiples; MED is n. of multiples obtained by computing the median of comparables multiples.

INDUSTRY				EV/EBIT		EV/EBITDA		Current P/E		Forward P/E		Tot.
Type	Sic Code	Name	Nr. of companies	AVG	MED	AVG	MED	AVG	MED	AVG	MED	
Cyclical	28	Chemicals and allied products	46	272	272	312	312	253	253	268	268	
Cyclical	36	Electronic and other electric equipment	28	156	156	175	174	155	155	143	143	
Cyclical	37	Transportation equipment	15	120	120	140	140	127	127	155	155	
Cyclical	33	Primary metals industry	12	98	98	84	84	84	84	71	71	
			101	**646**	**646**	**711**	**710**	**619**	**619**	**637**	**637**	*5.225*
Non - Cyclical	20	Food and kindred products	30	297	297	271	271	284	284	262	262	
Non - Cyclical	49	Utilities (Electric, Gas and Sanitary Services)	26	195	195	178	178	181	181	166	166	
Non - Cyclical	21	Tobacco products	2	11	11	24	24	23	23	22	22	
Non - Cyclical	24	Lumber and wood products	15	96	96	115	115	63	63	53	53	
			73	**599**	**599**	**588**	**588**	**551**	**551**	**503**	**503**	*4.482*
												9.707

3.4 Choice of Multiples

Kaplan and Ruback (1995), Kim and Ritter (1999), Gilson, Hotchkis and Ruback (2000) and Lie and Lie (2002) found that asset multiples (e.g. Enterprise Value (EV) to EBITDA, EV to EBIT) are more accurate than sales (e.g. price to sales, EV to sales) or equity multiples (e.g. P/E, market value to book value). However Cheng and McManara (2000) and Bajaj, Denis and Sarin (2004) affirm the importance of the P/E multiple. In addition Kim and Ritter (1999) show that forecast multiples work better than historical ones. Following the findings of the studies mentioned here above, I have evaluated the companies of my samples by applying the following multiples: current EV to EBITDA multiple, current EV to EBIT multiple, current and forward P/E multiple.

3.5 Identification of comparables

The identification of comparable companies is an important step when applying the multiples. Alford (1992) found that comparables chosen on the basis of the industry selection alone (when industry is identified by the first three digits of SIC code) produced the more accurate valuation (with the Price/Earnings multiple). Alford (1992) controls for other factors as size, leverage and earnings growth, but there is not improvement in the quality of results. Supported by these findings, in order to

minimize the estimation error, I have assumed the peer group to be composed by all the companies within the same industry. And more specifically within the same two-digit SIC code. If the number of companies in the same industry, as identified by the two-digit SIC code, is less than four (e.g. "Tobacco products" industry), the peer group is enlarged by including all the companies with the same one-digit SIC code, e.g. for the two Tobacco companies (SIC code: 21) the peer group is composed by all the companies from industries with a SIC code that start with two, i.e. "Lumber and Wood Products" (SIC Code: 24) and "Food and Kindred Products" (SIC Code: 20).

The identification of the peer group by industry positively impacts the accuracy in the usage of the Price to Earnings Ratio (P/E), which is heavily affected by accounting differences among companies. By splitting up the sample by industry classification, I can partially smooth out such accounting distortions, since firms in the same industry often adopt similar accounting methods (Foster, 1986).

Other studies show that when the choice of comparables is not only based on the industries to which they belong, but also on other constraints or factors, more accurate valuations are produced: Boatsman and Baskin (1981) include the historical growth rate of profits in the selection criteria of the peers; Cheng and McNamara (2000) include the size of total assets; Bhojraj and Lee (2002) include profitability, rate of growth and financial risk proxies. However, as Lie and Lie (2002) state, even if the procedure could be improved by involving comparable companies from different industries (but with similar characteristics), at the same time, subjectivity involved in choosing the peer group and the big effort needed for a big sample of companies would decrease the effectiveness of the choice. For this reason, following the work of Alford (1992) and Lie and Lie (2002), I have selected the peer group by simply referring to the companies in the same industry (same two digits SIC-code). Once comparables have been selected, comparable multiples are obtained by computing both means and medians of the peers' multiples.

3.6 Valuation Error

Companies value was estimated in my sample by multiplying the average (or median) multiple obtained from the comparable companies by the relevant financial figure of the company being valued. For each company of the cyclical and non-cyclical samples, I have estimated the value each year at the end of year (at December 31st), by obtaining in this way 13 valuations (estimated value EV_t) for each company and for each type of multiple (for the whole interval 1995 – 2007, when data are available and earnings are positive). After having obtained the estimates, I have compared them with the market value (observed value OV_t), more precisely, I have computed the difference of the natural logarithm of the estimated value minus the natural logarithm of the market value (as in Kaplan and Ruback, 1995; Kim and Ritter, 1999; and Gilson et al., 2000) and I called the result: "valuation error" ("VE").

Therefore VE is computed by the following formula:

$$VE_t = |ln(EV_t) - ln(OV_t)|$$

Where: EV_t is the estimated value on December 31st of year *t*, obtained by applying the comparable value of year *t* to the firm's financial figure of year *t* if current multiples, or to the firm financial figure at year *t+1*, if forward multiples; OV_t is the observed value on December 31st of year t.

Following Lie and Lie (2002), the observed value (OV_t) is obtained as total assets (December 31st) less book value of equity (at 31/12) plus the product of: price per common share and number of shares outstanding. The last item is obtained as the yearly average of the number of common shares outstanding at the end of each month times the closing price of the last day of each month.

As an alternative to the procedure described above, following Kim and Ritter (1999), I have also computed the adjusted-Enteprise Value, which is the Enterprise Value less "cash and cash equivalents". Therefore I have computed the multiples: adjusted-EV/EBIT and adjusted-EV/EBITDA.

I expect the difference to be, on average, smaller for non-cyclical companies, for which I expect a better accuracy of valuations.

3.7 Interpretation of Valuation Error (VE)

Once VE for each company are obtained, for each year in the sample, aim of this master thesis is to find out if cyclicality decreases the estimation accuracy (by multiples analysis); in other words if, on average, VE of cyclical companies are greater than VE of companies less subject to cyclicality. In order to assess this possible distortion, I have computed for each multiple the average and the medians for both the two samples of cyclical and non-cyclical companies and I have compared them. I have provided a detail of the comparison for each year.

Furthermore, I have carried out a OLS and a Logit analysis in order to understand which is the effect of the cyclical factor over the accuracy of the estimations (proxied by the valuation errors).

CHAPTER 4 Results

The previous chapter provided an overview of the methodology adopted in order to obtain the quantitative results presented in this chapter. Chapter n. 4 is composed of three main parts, each part reports the results of one of the application of the three methodologies: i) the comparison between plain averages of Valuatin Errors of cyclical and non cyclical companies; ii) OLS analysis and iii) Logit analysis. The last part of the chapter provides a summary of the results and some proposals for further research.

4.1 General sample statistics

The purpose of the first paragraph of this chapter is to demonstrate how VE of cyclical companies' are on average higher than VE of non cyclical companies, bringing to a greater misvaluation phenomenon.

Table n.6 and n.7 provide some general statistics of the sample analyzed.

Table 6 – Summary statistics for the cyclical sample of industries. The numbers on the column heads identify the industry: 1) 'Chemicals and allied products'; 2) 'Electronic and other electric equipment'; 3) 'Transportation equipment' and 4) 'Primary metals industry'.

Measure	Mean					Median					25th Percentile				75th Percentile			
	1	2	3	4	Tot	1	2	3	4	Tot	1	2	3	4	1	2	3	4
A. Descriptive Statistics																		
Book value of Assets (£ million)	2.931,9	471,5	1.854,4	444,0	1.794,2	65,6	43,3	297,1	123,6	84,9	14,4	19,9	94,0	42,3	397,4	250,5	1.072,6	651,8
Common Equity (£ million)	1.288,6	143,0	537,9	194,8	729,5	33,2	19,4	92,3	50,9	35,4	8,4	7,5	31,8	17,4	157,5	120,7	294,5	157,0
Total Enterprise Value (£ million)	5.239,9	1.000,9	2.609,8	889,4	3.157,2	153,3	153,3	430,4	170,3	35,4	36,3	31,5	129,1	65,5	558,4	719,1	2.027,1	1.517,2
EBITDA/Book value of Assets	0,02	0,02	0,1	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,00	0,03	0,1	0,1	0,2	0,2	0,2	0,2
EBIT/Book value of Assets	- 0,01	- 0,03	0,1	0,1	0,01	0,1	0,1	0,1	0,1	0,1	- 0,05	- 0,02	0,04	0,1	0,1	0,1	0,1	0,2
Cash/Book value of Assets	0,2	0,2	0,1	0,1	0,2	0,1	0,2	0,1	0,1	0,1	0,04	0,05	0,04	0,02	0,3	0,3	0,1	0,1
B. Multiples used in later analysis																		
Current EV/EBIT	15,2	15,8	17,0	15,4	15,7	14,3	15,0	15,9	13,4	15,0	11,6	12,2	14,1	10,5	18,8	18,3	20,5	19,7
Current EV/EBITDA	12,8	13,4	13,3	11,8	12,9	11,6	11,7	11,7	10,3	11,7	9,2	9,8	9,6	8,6	14,6	15,3	15,1	14,6
Current P/EPS	16,0	15,9	16,4	14,9	15,9	15,7	16,3	16,6	13,1	15,6	12,0	11,7	13,3	9,5	19,1	19,2	18,6	18,4
Forward P/EPS	14,3	14,1	12,7	13,0	13,8	13,5	12,9	12,6	10,9	12,8	10,7	9,5	10,3	8,5	16,5	17,0	14,5	13,7

1. Chemicals and allied products; 2. Electronic and other electric equipment; 3.Transportation equipment; 4. Primary metals industry.

Table 7 - Summary statistics for the non-cyclical sample of industries. The numbers on the column heads identify the industry: 5) 'Lumber and wood products'; 6) 'Tobacco products'; 7) 'Utilities (Electric, Gas and Sanitary Services)'; 8) 'Food and kindred products'.

Measure	Mean					Median					25th Percentile				75th Percentile			
	5	6	7	8	Tot	5	6	7	8	Tot	5	6	7	8	5	6	7	8
A. Descriptive Statistics																		
Book value of Assets (£ million)	223,7	13.758,5	6.032,5	2.496,4	3.597,4	71,9	8.179,5	667,9	197,7	227,6	16,8	2.957,3	58,5	60,7	539,8	17.627,3	5.357,0	2.655,9
Book value of Common Equity (£ million)	106,0	2.043,2	2.298,8	841,5	1.242,3	36,8	848,5	225,7	120,2	108,3	7,7	- 783,0	14,9	22,8	251,6	4.611,0	1.678,2	914,1
Total Enterprise Value (£ million)	312,5	23.531,6	63.420,3	8.349,9	26.728,4	88,8	22.320,0	3.893,7	240,9	550,9	22,0	8.704,4	518,3	71,5	632,4	29.740,7	23.107,5	3.888,4
EBITDA/Book value of Assets	0,1	0,2	0,8	0,1	0,4	0,1	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,3	0,2	0,2
EBIT/Book value of Assets	0,1	0,2	0,7	0,1	0,3	0,1	0,1	0,1	0,1	0,1	0,05	0,1	0,05	0,1	0,1	0,3	0,1	0,1
Cash/Book value of Assets	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,1	0,01	0,1	0,02	0,02	0,1	0,2	0,1	0,1
B. Multiples used in later analysis																		
Current EV/EBIT	13,9	14,9	15,0	14,0	14,2	12,7	14,2	14,4	13,6	13,5	9,4	11,4	11,8	10,7	19,1	16,1	17,8	16,5
Current EV/EBITDA	12,1	13,2	11,5	11,0	11,5	10,5	12,1	10,2	9,5	10,3	8,3	10,0	8,7	8,3	14,8	13,7	12,6	13,1
Current P/EPS	14,1	15,3	14,4	13,9	14,1	16,9	14,4	13,1	13,2	13,1	12,5	11,9	9,6	10,2	20,7	17,4	17,5	16,9
Forward P/EPS	13,0	10,3	13,2	12,7	12,8	12,8	10,0	11,6	12,2	11,2	8,8	9,1	9,5	9,7	20,7	11,3	15,4	14,8

5. Lumber and wood products; 6. Tobacco products; 7. Utilities (Electric, Gas and Sanitary Services); 8. Food and kindred products

Looking at Panel B of both tables, it is worth to notice (by looking at the column of totals) that all the means and medians of the cyclical industries multiples (current EV/EBIT, current EV/EBITDA, current P/E and forward P/E) are greater than means and medians of non-cyclical industries. This finding is probably due to the greater capital intensity of cyclical industries (as Primary Metals, Chemicals, Electronics, etc) compared to the non cyclical ones (as Utilities, Tobacco, etc.). This finding is confirmed by means and medians of Book Value of Assets, Common Equity and Total Enterprise Value, which are greater for the non cyclical industries (Panel A of tables 6 and 7).

Furthermore, looking at panel B of both tables one can see that almost all the means are greater than medians, suggesting that the distributions of multiples can be positively skewed.

Table n.8, in Panel A, provides an overview of Valuation Errors (VE) computed for a selection of companies within the sample of cyclical industries that actually show volatility in their earnings: only companies for which standard deviation of natural logarithm of earnings before interests and taxes (EBIT), in the period 1995 - 2007, is equal to - or greater than - 0.9 are considered in the analysis. On the left side, the table presents the number of comparisons between observed value and estimated value, for each industry and for each type of multiple, while the right side reports the average of Valuation Errors. The same results' representation is provided for the non-cyclical industries in Panel B.

Table 8 – Valuation Errors (VE).
VE is computed is computed as $|ln(EV_t) - ln(OV_t)|$ where EV is the estimated value and OV is the Observed Value at the end of the year *t*.
Panel A shows results for the sample of cyclical companies, while Panel B shows results for the sample of non-cyclical companies.
Within the cyclical sample (Panel A), only companies that actually show volatility in the path of their earnings are considered (Standard Deviation of natural logarithm of EBIT in the period 1995 to 2007 equal to or higher than 0.9).

Industry	Nr. of observations				Average |VE|				Difference	
	(1) Avg	(2) Avg Adj	(3) Med	(4) Med Adj	(1) Avg	(2) Avg Adj	(3) Med	(4) Med Adj	(1)-(2)	(3)-(4)
1. Chemicals and allied products	***368***	***184***	***368***	***184***						
EV/EBIT	92	92	92	92	0,29	0,28	0,29	0,29	4,2%	1,8%
EV/EBITDA	92	92	92	92	0,35	0,34	0,35	0,34	2,1%	1,3%
Current P/E	92		92		0,31		0,32			
Forward P/E	92		92		0,31		0,32			
2. Electronic and other electric equipment	***224***	***112***	***225***	***112***						
EV/EBIT	56	56	57	56	0,35	0,33	0,33	0,43	5,7%	-28,7%
EV/EBITDA	56	56	56	56	0,34	0,40	0,32	0,40	-18,2%	-23,6%
Current P/E	56		56		0,55		0,60			
Forward P/E	56		56		0,33		0,35			
3. Transportation equipment	***120***	***60***	***120***	***60***						
EV/EBIT	30	30	30	30	0,25	0,27	0,26	0,26	-6,9%	1,6%
EV/EBITDA	30	30	30	30	0,33	0,32	0,31	0,30	5,1%	2,9%
Current P/E	30		30		0,24		0,24			
Forward P/E	30		30		0,28		0,29			
4. Primary metals industry	***96***	***48***	***96***	***48***						
EV/EBIT	24	24	24	24	0,37	0,36	0,39	0,38	1,5%	4,0%
EV/EBITDA	24	24	24	24	0,32	0,29	0,31	0,31	7,0%	1,9%
Current P/E	24		24		0,46		0,37			
Forward P/E	24		24		0,50		0,47			
Tot.	808	404	809	404	**2.425**					

Panel B - Non-cyclical Industries

Industry	Nr. of observations				Average |VE|				Difference	
	(1) Avg	(2) Avg Adj	(3) Med	(4) Med Adj	(1) Avg	(2) Avg Adj	(3) Med	(4) Med Adj	(1)-(2)	(3)-(4)
5. Lumber and wood products	***60***	***30***	***60***	***30***						
EV/EBIT	15	15	15	15	0,34	0,33	0,32	0,32	2,1%	0,7%
EV/EBITDA	15	15	15	15	0,40	0,38	0,36	0,35	4,6%	0,9%
Current P/E	15		15		0,36		0,37			
Forward P/E	15		15		0,44		0,49			
6. Tobacco Products	***8***	***4***	***8***	***4***						
EV/EBIT	2	2	2	2	0,48	0,46	0,49	0,48	3,5%	3,5%
EV/EBITDA	2	2	2	2	0,22	0,22	0,24	0,27	0,5%	-10,6%
Current P/E	2		2		0,25		0,25			
Forward P/E	2		2		0,23		0,24			
7. Utilities (Electric, Gas and Sanitary Services)	***104***	***52***	***104***	***52***						
EV/EBIT	26	26	26	26	0,54	0,29	0,54	0,29	47,5%	46,0%
EV/EBITDA	26	26	26	26	0,33	0,32	0,30	0,31	4,4%	-4,8%
Current P/E	26		26		0,51		0,49			
Forward P/E	26		26		0,39		0,39			
8. Food and Kindred products	***120***	***60***	***120***	***60***						
EV/EBIT	30	30	30	30	0,25	0,25	0,25	0,25	0,7%	1,6%
EV/EBITDA	30	30	30	30	0,30	0,30	0,28	0,29	1,1%	-2,1%
Current P/E	30		30		0,26		0,26			
Forward P/E	30		30		0,29		0,28			
Tot.	292	146	292	146	**876**					

(1) Avg = VE obtained with Estimated Values computed by averaging comparables' multiples

(2) Avg Adj = VE obtained with Estimated Values computed by averaging comparables' multiples. To the Enterprise Value (EV) is substracted the item: *Cash and Cash Equivalents.*

(3) Med = VE obtained with Estimated Values computed by the median of comparables' multiples

(4) Avg Adj = VE obtained with Estimated Values computed by the median of comparables' multiples. To the Enterprise Value (EV) is substracted the item: *Cash and Cash Equivalents.*

VEs range from 0.23 to 0.62 for cyclical companies, while VE of non-cyclical industries range from 0.22 to 0.61. Looking at the adjusted-EV ('normal' Enterprise Value less *Cash and Cash Equivalents*) on 25 cases over 32, VEs derived from adjusted-EV are more accurate than VEs computed with the 'normal' Enterprise Value (columns 2-4 of both panels). In those 25 cases for which the usage of Adjusted-EV leads to a lower VE, the difference between VE obtained by using

adjusted-EV and 'normal' Enterprise Value [10] is 3.3% for cyclical industries while is 9.3% for non-cyclical industries. The valuation of companies within the non-cyclical industries seems to be more prone to cash distortions. The Utilities (Electric, Gas and Sanitary Services) industry shows the greatest difference: on average VE based on 'normal' EV/EBIT is greater by 47.5% than VE based on the Adjusted-EV/EBIT multiple.

As in previous studies (Clayman and Schwartz, 1994; Dreman and Berry, 1995; Olsen, 1996; Copeland, Koller and Murrin, 2005) also in my sample of data, EPS forecasts (drawn from I/B/E/S Global Aggregate Database) appear to be overestimated. The results of the comparison between the estimates of the financial figure at the end of the current year with the observed EPS at the end of the same year are reported in the following tables.

Table 9 - EPS statistics and forecasts' errors for the non-cyclical industries.

	Observed EPS			Forecasted EPS			Difference	%
	Average (a)	Max	Min	Average (b)	Max	Min	(b) - (a)	
5. Lumber and wood products	7,46	48,89	-94,81	14,83	74,00	-0,49	7,37	98,8%
6. Tobacco products	50,38	116,24	8,47	70,96	135,69	29,41	20,58	40,9%
7. Utilities (Electric, Gas and Sanitary Services)	37,17	1299,14	-83,97	41,38	1.299,14	-36,40	4,21	11,3%
8. Food and kindred products	30,64	331,11	-88,72	33,40	324,34	-11,12	2,76	9,0%
Average	31,41			40,14			8,73	40,0%

Table 10 – EPS statistics and forecasts' errors for the cyclical industries.

	Observed EPS			Forecasted EPS			Difference	%
	Average	Max	Min	Average	Max	Min	(b) - (a)	
1. Chemicals and allied products	-12,02	995,61	-8795,95	-5,81	1050,97	-8795,95	6,21	51,7%
2. Electronic and other electric equipment	-51,15	187,49	-7815,13	-42,41	170,72	-7815,13	8,74	17,1%
3.Transportation equipment;	8,83	60,91	-92,23	15,00	74,12	-82,51	6,17	69,8%
4. Primary metals industry.	29,40	1033,47	-43,42	21,65	208,25	-4,53	-7,74	26,3%
Average	-6,23			-2,89			3,34	41,2%

The last column of the two tables gives the percentage difference between the averages of the forecast EPS and the estimated EPS. The difference is always positive, except for one cyclical industry (Primary Metals). The two tables show that, on average, forecast earnings overestimate actual earnings by 40% in the four cyclical companies and by 41,2% in the non-cyclical companies (in the 1995 – 2007 period).

[10] 'Normal' EV is estimated as total assets less book value of equity plus the product of price per common share and number of common shares outstanding.

4.2 Comparison of Valuation Errors (VE)

Table n. 11 presents a summary of VE results by type of multiple and by type of industry (cyclical or not cyclical). For each type of multiple, the average (Panel A) and the median (Panel B) of all VE of companies included in that specific type of industry have been computed. It is important to highlight that, within the cyclical sample, only companies that actually show cyclicality in the path of their earnings were selected for this test (companies with standard deviation of natural logarithm of EBIT in the period 1995-2007 equal or greater than 0.9).

Looking at the results in table n.11, one can see that for each type of multiple, except for EV/EBIT, VE computed for the sample of cyclical industries are on average larger than VE computed for the sample of non-cyclical companies. The difference is statistically significant at 95% confidence level for VE computed with the Forward P/E multiple (averages and medians, column 3 of table 11, panel A/B) and for VE computed with the current P/E multiple (only averages, column 4 of table 11, panel A); at 90% confidence level, for VE computed with EBITDA multiple (averages, column 2 of table 11, panel A); at 99% confidence level for VE computed with EBITDA multiple (median, column 2 of table 11, panel B) and for VE computed with the adjusted version of EBIT and EBITDA (column 5 and 6 of table 11, panel A/B). The median of all VEs gives similar results. VEs computed for the sample of cyclical industries are on average from 0.02% to 21.1% greater than VEs of non-cyclical industries. When adjusting for 'cash and cash equivalents' (columns 5 and 6 of Panels A/B of table n.11) the difference in the accuracy of valuations between the two types of industries increases, but while the accuracy of valuations for cyclical industries does not differ too much from the previous results (columns 1 and 2), the accuracy of valuation for non-cyclical industries improves significantly (at least for the EV/EBIT multiple). This means that 'cash and cash equivalents' item represents a greater distortion in the valuation by multiple analysis of non-cyclical industries. This supports the results about cash distortion of non-cyclical industries raised by the interpretation of results in table n. 8.

Table 11 – Summary of VE per type of multiple.
Within the cyclical sample only companies that actually show cyclicality in the path of their earnings are considered (companies with standard deviation of natural logarithm of EBIT in the period 1995 – 2007 equal to or greater than

0.9). With respect to Independent sample t-test of the differences between the two averages equal to zero, *,** and * indicate significance at the 1, 5, and 10 percent level respectively.**

Panel A

Average	EV/EBIT (1)	EV/EBITDA (2)	Forward P/E (3)	Current P/E (4)	Adjusted-EV/EBIT (5)	Adjusted-EV/EBITDA (6)
Cyclical (a)	0,345	**0,343**	**0,392**	**0,369**	**0,331**	**0,390**
Non-Cyclical (b)	**0,358**	0,329	0,369	0,343	0,285	0,320
Diff. % (a) - (b)	**-3,7%**	**4,0%**	**6,0%**	**7,0%**	**13,8%**	**18,1%**
T-test p-vlaues	**0,543**	**0,047***	**0,022****	**0,030****	**0,000*****	**0,000*****

Panel B

Median	EV/EBIT (1)	EV/EBITDA (2)	Forward P/E (3)	Current P/E (4)	Adjusted-EV/EBIT (5)	Adjusted-EV/EBITDA (6)
Cyclical (a)	0,316	**0,348**	**0,377**	**0,345**	**0,359**	**0,391**
Non-Cyclical (b)	**0,353**	0,303	0,361	0,345	0,283	0,310
Diff. % (a) - (b)	**-12,0%**	**12,9%**	**4,2%**	**0,02%**	**21,1%**	**20,8%**
T-test p-vlaues	**0,345**	**0,003*****	**0,032****	**0,212**	**0,000*****	**0,000*****

Table n.12 gives a summary of the VE for the two samples of companies (cyclical and non-cyclical), with a detail for each year.

Table 12 – Summary of VE per year.
Within the cyclical sample only companies that actually show cyclicality in the path of their earnings are considered (companies with standard deviation of natural logarithm of EBIT in the period 1995 – 2007 equal to or greater than 0.9).

Panel A

EV/EBITDA

Average	Y95	Y96	Y97	Y98	Y99	Y00	Y01	Y02	Y03	Y04	Y05	Y06	Y07
Cyclical (1)	0,228	0,244	0,214	0,320	0,314	**0,445**	**0,432**	**0,379**	**0,339**	**0,371**	0,360	**0,374**	0,284
Non-Cyclical (2)	**0,261**	**0,361**	**0,323**	**0,339**	**0,336**	0,371	0,301	0,312	0,308	0,293	**0,373**	0,290	**0,296**
Diff. % (1) - (2)	**-14,5%**	**-48,1%**	**-50,7%**	**-6,0%**	**-7,0%**	**16,6%**	**30,3%**	**17,7%**	**9,1%**	**21,1%**	**-3,6%**	**22,5%**	**-4,2%**

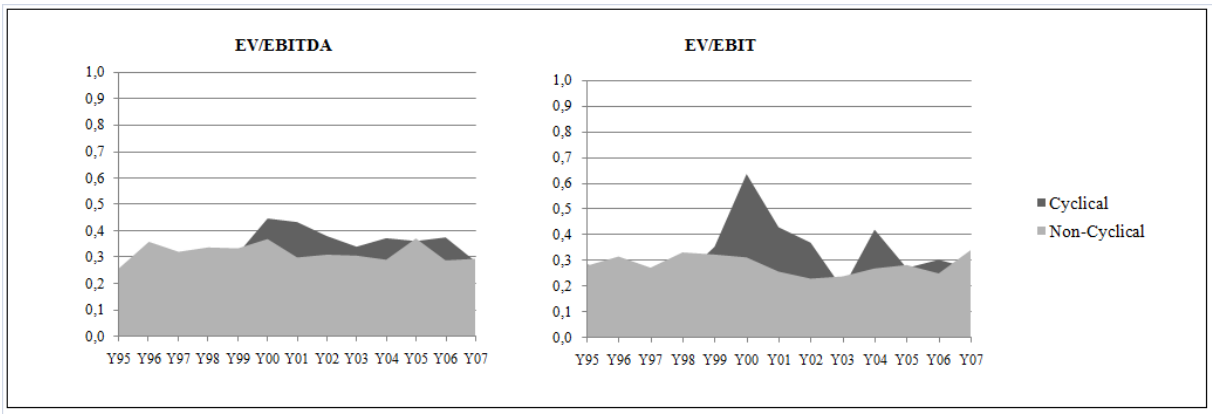
Panel B

EV/EBIT

Average	Y95	Y96	Y97	Y98	Y99	Y00	Y01	Y02	Y03	Y04	Y05	Y06	Y07
Cyclical (1)	**0,288**	0,253	0,197	0,237	**0,356**	**0,639**	**0,432**	**0,372**	0,192	**0,422**	0,273	**0,305**	0,272
Non-Cyclical (2)	0,281	**0,318**	**0,274**	**0,333**	0,325	0,314	0,259	0,232	**0,240**	0,271	**0,284**	0,252	**0,342**
Diff. % (1) - (2)	**2,2%**	**-25,7%**	**-39,4%**	**-40,5%**	**8,5%**	**50,9%**	**40,1%**	**37,7%**	**-24,8%**	**35,9%**	**-4,3%**	**17,4%**	**-25,9%**

For this kind of analysis the focus is only on EV/EBIT (Panel A) and on EV/EBITDA multiples (Panel B). It is of interest to see the path of VE in the period analysed, which is more clear from the graphical representation in figure n. 3.

Figure 5 - VE per year.
Within the cyclical sample only companies that actually show cyclicality in the path of their earnings are considered (companies with standard deviation of natural logarithm of EBIT in the period 1995 – 2007 equal to or greater than 0.9).

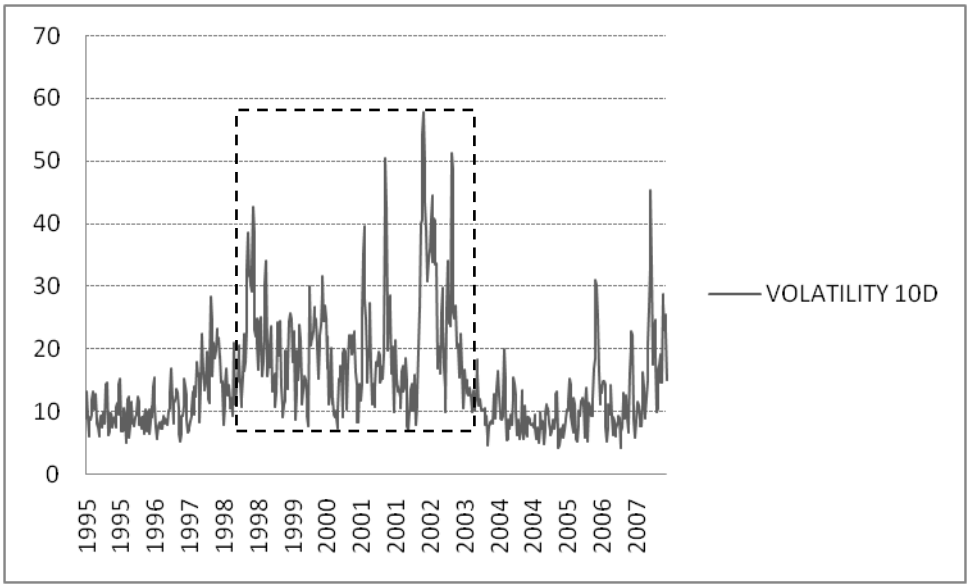


For both EV/EBITDA and EV/EBIT multiples, VEs of non-cyclical companies are greater than VEs of cyclical ones until 1999 and, from this point onwards, VEs of cyclical companies are almost always larger than VEs of non-cyclical ones. Figure n.4 presents the path of historical quotations for the FTSE 100, the main stock index listed on the London Stock Exchange in the interval April 1984 to January 2009.

Figure 6 – FTSE 100 in the interval: April, 1984 – January, 2009.
Source: http://finance.google.co.uk.

Looking at the next figure (figure n.7), which represents the volatility path for the same index, we can see as the index volatility increases from 1999 on; until 1999 the index shows a constant year-to-year growth.

Figure 7 - FTSE100 10 days volatility: 1995 – 2007.
Bloomberg Financial Database



The dotted box in figure n.5 highlights the interval of years 1998 - 2003, where the index volatility is larger. Looking at figure n. 5, during the same interval of years, both multiples (EV/EBIT and EV/EBITDA) show the highest VE. The increase in VE for the sample of cyclical companies seems to be related to the increase in volatility of the major UK stock index. This believe is confirmed by the results provided in the next paragraphs, where the Logit analysis shows as an increase in the index volatility measure leads to a increase of the odds of "cyclical occurrence".

4.3 OLS analysis

In this chapter, I have reported the results from the OLS analysis estimated for the total sample of data (no restrictions on company standard deviation of EBIT are imposed here). Therefore the companies in the sample analyzed are active and non active firms whose data refer to the interval 1995 to 2007. VE included in the analysis derive from the computation of company values by applying the four multiples described in the previous chapters (current EV/EBIT; current EV/EBITDA; current P/E and forward P/E). For each company 13 valuation errors for each type of multiple are available, one for each year in the interval 1995 – 2007 (where accounting data are available and earnings are positive).

The model is built as follow:

Dependent variable: 'VE' (Valuation Errors of the whole sample of cyclical and non cyclical companies);

Independent variables:

- 'Cyclical dummy': dummy equal 1 if the VE is referred to a company that comes from one of the 4 cyclical industries, 0 otherwise;

- 'Company Volatility': is the relative Standard Deviation, computed as the standard deviation of EBIT, observed in the period 1995-2007, over the average of EBIT in the same period. Initially I included a proxy for the volatility of the FTSE100 (which is the major stock index in UK), but the variable did not improve the model, so it has been deleted.

- 'Lev' which is a proxy for risk, and is obtained as long-term total debt scaled by the total common equity of the firm. I have included this variable for completeness, in case it captures elements of cross-sectional risk not captured by the other variables;

- 'Year': dummy for the year during which the VE is observed (all VEs are computed at the end of year);

- 'Size': natural logarithm of the company total assets;

- 'PM' (operating profit margin): EBIT over total Sales, multiplied by 100; this variable is a proxy for profitability;

- 'ROA': return on total assets, multiplied by 100. Having already controlled for profit margins, this variable controls for a firm's asset turnover.

In order to better understand the effect of each independent variable, I tested three versions of the model, the first one where all the variables mentioned before are included. In the second model I excluded the 'cyclical dummy', while in the third model I excluded 'Company volatility', since it is possible the two variables could convey overlapping effects to the model.

The results of the analysis are reported in the table that follows (the coefficients results related to the year dummies are not reported):

Table 13 - OLS Analysis: model coefficients, R^ and Adjusted R^

Dependent variable: ASS_VE									
Model	**Coefficients independent variables**							**R^**	**Adjusted - R^**
	Cyclical dummy	Company Volatility	Lev	ROA	PM	Size	(Constant)		
1	0,007**	0,001***	0,001***	0,0004***	0,001***	-0,012***	0,316***	4%	3,9%
2		0,001***	0,001***	0,000***	0,001***	-0,012***	0,322***	3,9%	3,8%
3	0,005**		0,001***	0,000***	0,001***	-0,012***	0,310***	3,5%	3,4%

***,** and * represent coefficient significance at 99%, 95% and 90% respectively

The year dummies coefficients are not reported for clearness.

The table shows as in the first model (first row) all the variables, but one ('Size' of the company), give a positive contribute to the magnitude of VE. All the variables included in the model (except for some years) have a statistically significant coefficient. Looking at the first model, the variable 'Cyclical' is positively related to the dependent variable (positive coefficient equal to 0,007) and its p-value is less than 0,05, this means observations coming from cyclical companies contributes positively to VE. In other words cyclical companies are expected to show a higher VE.

The proxy for the volatility of company earnings is statistically significant at 99% and, as expected, its coefficient is positive (equal to 0,001); an increase in the volatility of earnings of the company, which is linked to the cyclical behaviour of the company, is related to a higher VE as well.

Another interesting result is that the variable 'Size' has as large negative coefficient (equal to -0,012) and it is statistically significant (at 99%). This is in line with intuition and previous literature (Lie&Lie, 2002 and Alford, 1992), as an increase in the size of the company, which presumes a larger diversification over projects, products and locations, should lead to more stable cash flow/earnings leading to a lower cyclical behaviour of the company which implies smaller valuation errors.

Although not reported in the table, some years, from 1998 to 2001, have a positive (statistically significant) effect on the valuation errors (year 1998 has a coefficient of +0,06; year 1999 has a coefficient of +0,60; year 2000 has a coefficient of +0,080 and finally 2001 has a coefficient of +0,044; all of them are significant at 99%). This output is probably linked to the two crises, Russian crisis ("Ruble crisis") and 9/11 terroristic attack, that hit the economy in those years and which increased earnings and shares price volatility, leading to higher valuation errors when applying multiples. These results partially match the results obtained by the comparison of the averages of Valuation Errors, where, in the same interval of years, VE showed a peak (as one can see from figure n.5 in the previous paragraph).

The interpretation of the other variables is more difficult since the aim of their inclusion is to control for other general effects not captured from the variables mentioned above.

In model number 2, I excluded the cyclical dummy, but, as one can see, from table 13, the coefficients have the same values, while the constant of the model shows a small variation: company volatility still has a positive effect on VE (coefficient +0,001 significant at 99% confidence level) and Size a negative effect (coefficient -0,012 significant at 99% confidence level). The last row of the table shows a third version of the model where the company volatility variable is excluded. Still the only value that changes is the constant, but in the third model, also the R^ decreases significantly, indicating that the company volatility it is an important factor in explaining the proportion of variation in the dependent variable.

The table that follows analyzes the existence of collinearity among the variables (when all the variables are included, as in model number 1). The output shows this kind of distortion is not present

among the variables in the model (the values under the column "Condition Index" are always lower than 15).

Table 14 – OLS Analysis: Collinearity diagnostic (OLS model 1)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions																		
				(Constant)	Cyclical	CompVolat	PM	Lev	ROA	Size	Y95	Y96	Y97	Y98	Y99	Y00	Y01	Y02	Y03	Y04	Y05	Y07
1	1	3,9	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	2	2,1	1,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	3	1,1	1,9	0,0	0,0	0,1	0,0	0,3	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0
	4	1,1	1,9	0,0	0,0	0,2	0,0	0,2	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0
	5	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,1	0,0	0,0	0,0	0,0
	6	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,0	0,0	0,0	0,2
	7	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,1	0,1	0,1	0,0	0,0	0,1	0,0
	8	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0
	9	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,0	0,1	0,1	0,0	0,0	0,0	0,0	0,1	0,0
	10	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,2	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0
	11	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,3	0,0	0,0	0,0	0,0	0,1	0,0	0,0
	12	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,1	0,2	0,1	0,0
	13	1,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,2	0,0	0,0	0,0	0,0
	14	0,9	2,0	0,0	0,0	0,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	15	0,9	2,1	0,0	0,0	0,0	0,0	0,5	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0
	16	0,5	2,7	0,0	0,3	0,0	0,0	0,0	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	17	0,4	3,3	0,0	0,5	0,0	0,0	0,0	0,3	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	18	0,1	5,9	0,0	0,1	0,0	0,0	0,0	0,0	0,6	0,2	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
	19	0,0	10,8	1,0	0,1	0,0	0,0	0,0	0,0	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3

4.4 Logit Analysis

As a robustness test, I have also carried out a logit analysis. A logit analysis is based on the Maximum Likelihood Estimation method (MLE) which is a more powerful method than linear regression and it is not subject to the same degree to the classical assumptions (e.g. absence of heteroskedasticicy or collinearity) that must be met for a OLS analysis.

Within a Logit model, the dependent variable is a dichotomous dummy variable, the variable can take only two values, 1 and 0; therefore I have structured the Logit model in a slightly different way, 'Cyclical dummy' is the (dummy) dependent variable, equal 1 if the company comes from a cyclical sector, 0 otherwise (in the OLS model this variable was one of the independent variable). The sample of data analyzed is the same as the one analyzed for the OLS analysis. The other variables are:

- 'ASS_VE' which is the absolute value of observed VE (the dependent variable in the previous model);

- 'Lev' which is a proxy for risk, and is obtained as long-term total debt scaled by the total common equity of the firm. I have included this variable for completeness, in case it captures elements of cross-sectional risk not captured by the other variables;

- 'CompVolat': is the relative Standard Deviation, computed as the standard deviation of EBIT, observed in the period 1995-2007, over the average of EBIT in the same period. Initially I included a proxy for the volatility of the FTSE100 (which is the major stock index in UK), but the variable did not add new information to the model, so it has been deleted;

- 'Year': dummy for the year during which the VE is observed (all VE are computed at the end of the year);
- 'Size': natural logarithm of the company total assets;
- 'PM' (operating profit margin): EBIT over total Sales, multiplied by 100; this variable is a proxy for profitability;
- 'ROA': return on total assets, multiplied by 100. Having already controlled for profit margins, this variable controls for a firm's asset turnover.

The table that follows reports the results about the coefficients of the model (the years dummies coefficient results are not reported). It allows to understand the predicted change in odds for a unit increase in the predictors (independent variables in the model), therefore it allows to understand the roles of each parameter in the model.

Table 15 – Logit Analsys: coefficients, Cox & Snell R^ and Nagelkerke R^ .

Dependent variable: Cyclical dummy									
Model	**Coefficients independent variables**							**Cox & Snell R^**	**Nagelkerke R^**
	Ass_VE	Company Volatility	Lev	Size	PM	ROA	(Constant)		
1	0,251***	0,012***	- 0,003	-0,142***	-0,048***	0,070***	1,091***	12,3%	16,4%
2	0,229***		- 0,003	-0,139***	-0,047***	0,071***	1,008***	11,8%	15,7%

***,** and * represent coefficient significance at 99%, 95% and 90% respectively
The year dummies coefficients are not reported for clearness.

In the first version of the model (first row), where all the variables are included, the table shows as an increase in the VE variable increases the odds that the observation is referred to a cyclical company ('ASS_VE' has a positive coefficient equal to 0,251 and it is significant at 99% confidence level). In other words cyclical companies have a higher probability to have a larger VE. Also increasing values of the variable 'Company volatility' correspond to increasing odds of cyclical occurrence ('Company volatility' has a positive coefficient equal to 0,012 and it is significant at 99% confidence level). This result is straight, higher volatility of companies' share price is certainly linked to earnings, volatility of those companies. This results confirm the output from the OLS regression where earnings volatility of the companies analyzed positively affects the magnitude of VE.

Also the variable 'Size' shows a result which is in line with the result of the OLS analysis. Increasing values of size correspond to decreasing odds of cyclical occurrence (the variable has a negative coefficient equal to -0,142 and it is significant at 99% level). This is in line with the results obtained by the OLS model and by previous literature (Lie and Lie, 2002 and Alford, 1992).

The other variables (‘Lev’, ‘PM’, ‘ROA’ and the year dummies) are of difficult interpretation and they have been added mainly to control for other elements not captured by the commented variables.

In the version number 2 of the model, in order to better understand the effect of each of the predictor variables on the dependent variables, I excluded the variable ‘company volatility’. The coefficients results are very similar to the coefficients results of the Logit model n.1., therefore the interpretation is the same.

The R-square statistic cannot be exactly computed for the logistic regression models, so ‘Cox & Snell’ and ‘Nagelkerke’ approximation of the R square have been computed instead. They are respectively 12,3% and 16,4% for the model with all the variables and 11,8% and 15,7% for the model where company volatility is excluded.

4.5 Conclusions

The quantitative results reported in this chapter allow to conclude that cyclicality, which leads to a raise of companies earnings volatility in some sectors of the economy, implies a decrease of the accuracy of companies value estimation, when applying a multiples analysis.

As a matter of fact, the sample of 101 cyclical companies analyzed during the period 1995 – 2007 shows, on average, higher differences between the estimated value and observed values on the market (VE), compared with the sample of 73 companies coming from non-cyclical sectors. Furthermore, OLS analysis and Logit analyses confirmed that cyclicality has a positive effect on valuation errors' size.

A possible reason for the lower accuracy seems to be the influence that the higher volatility of those companies stock prices has on multiples, which is confirmed by the correspondence of periods of high stock prices volatility with periods where VE are particularly large. The logit analysis shows that the volatility of the stock index increases the odds for the 'cyclicality' occurrence. Moreover, the OLS analysis confirms that an increase in company earnings' volatility increases valuation errors.

Other factors affecting valuation errors are the size of the company (smaller companies are linked to lower valuation accuracy) and some years (years from 1998 to 2003 are related to higher valuation errors).

The management of cyclical companies can in some way avoid or at least reduce the negative effects of cyclicality of its company by, for example, "Macromanaging" production and inventory turnover in anticipation of recession and recovery; deploying "production-to-order" type system to reduce inventory needs; cutting capital expenditures in anticipation of recession to protect cash flow or, on the contrary, by improving expenditures, in order to acquire cheap assets on the market; etc. A proper management of cyclicality could even bring the company to outperform its peers, becoming an opportunity, rather than a threat for the management.

The analysis presented in this study can be expanded in different directions, e.g. by including other type of multiples (e.g. sales multiples), other kind of industries or companies coming from other countries than the UK. Moreover, further research could inspect other variables affecting valuation errors, for example, by including observations coming from the current years (2008 - 2009), one can observe the effect that the strong recent volatility on the market has on valuation errors.

REFERENCES

Alford, A. 1992. "The Effect of the Set of Comparable Firms on the Accuracy of the Price–Earnings Valuation Method." *Journal of Accounting Research*, vol. 30, no. 1 (Spring):94–108.

Arzac E., *"Valuation for Mergers, Buyouts and Restructurings"* – 281 pages (2005), John Wiley & Sons;

Bajaj M., Denis D. J., Sarin A., 2004, "Mean reversion in earnings and the use of E/P multiples in corporate valuation", *Journal of Applied Finance* 14, 4-10.

Baker, M. P., and Ruback R.S., "Estimating Industry Multiples", working paper, Cambridge, MA: Harvard Business School,1999

Baker, M. P., and J. Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57, 1–32.

Barberis, N. and M. Huang, 2001, Mental accounting, loss aversion, and individual stock returns, *Journal of Finance* 56, 1247–1292.

Berger, P.G., and E. Ofek. 1995. "Diversification's Effect on Firm Value." *Journal of Financial Economics*, vol. 37, no. 1 (January):39–65.

Berger, P.G., and E. Ofek. 1996. "Bustup Takeovers of Value-Destroying Diversified Firms." *Journal of Finance*, vol. 51, no. 4 (September):1175–1200.

Berger, P.G., and E. Ofek. 1999. "Causes and Effects of Corporate Diversification Programs." *Review of Financial Studies*, vol. 12, no. 2 (Summer):311–345.

Berman J., Pfleeger J., 1997. "Which industries are sensitive to business cycles?", *Monthly Labour Review*, 120 (2), 19-25.

Berk, J.; DeMarzo, P.; "Corporate Finance", Person International Edition, 1997.

Bhojraj S., Lee C. M. C., 2002, "Who Is my Peer? A valuation-Based Approach to the selection of comparable firms", *Journal of Accounting Research* 40, 407-439.

Bhojraj, S., Lee, C.M.C., Ng, D.T., 2003. "International Valuation Using Smart Multiples". Working paper, Cornell University.

Boatsman J.R., Baskin E. F., 1981, “Asset valuation with incomplete markets", Accounting Review 56, 38-53.

Bohm-Bawerk, Eugen, 1895, "The Positive Theory of Capital and Its Critics", *The Quarterly Journal of Economics*, VoJ.9,No.2,pp.113-131.

Boudoukh, J.M., Richardson, M., Whitelaw, R.F., (1994); “Industry Returns and the Fisher Effect”, *Journal of Finance*, Vol. XLIX, no. 5.

Brealy R.A., Myers S.C. and Allen F.; *Corporate Finance*, Eight Edition, McGraw-Hill International Edition, 2005

Cheng C. S. A., McNamara R., 2000, “The valuation accuracy of the price- earnings and price-book benchmark valuation methods", Review of Quantitative Finance and Accounting 15, 349-370.

Chopra, V.K., “Why so much error in analysts’ earnings forecast?”, *Financial Analysts Journal*, November/December 1998.

Clayman, M., and Schwartz, R., 1994. "Falling in Love Again—Analysts' Estimates and Reality." *Financial Analysts. Journal*, vol. 50, no. 5 (September/October):66-68.

Cooper, M., O. Dimitrov, and P.R. Rau. 2001. “A Rose.com by Any Other Name.” *Journal of Finance*, vol. 65, no. 6(December):2371–2388.

Copeland T., Koller T., Murrin J., *Valuation: Measuring and Managing the Value of Companies*, Fourth Edition by McKinsey & Company, Inc., June 8, 2005.

D’Mello, R. and P. K. Shrof, 2000, Equity undervaluation and decisions related to repurchase tender offers: An empirical investigation, *Journal of Finance* 55, 2399 – 2424.

Damodaran, A., 2006. Damodaran on Valuation, 2nd edition. Wiley, Hoboken, NJ. Manuscript provided by the author, http://www.damodaran.com, April 04, 2006.

Daniel, K. D., D. Hirshleifer, and A. Subrahmanyam, 2001, Overconfidence, arbitrage, and equilibrium asset pricing, *Journal of Finance* 56, 921–965.

Daniel, K. D., D. Hirshleifer, and S. H. Teoh, 2002, Investor psychology in capital markets: Evidence and policy implications, *Journal of Monetary Economics* 49 (1)/Carnegie Rochester Series in Public Policy 56, 139–209.

De Heer, M., Koller, T., Schauten, M.B.J., Steenbeek, O.W., 2000 (September, 1st version), "The valuation of cyclical companies".

Denis, D.J., D.K. Denis, and A. Sarin. 1997. "Agency Problems, Equity Ownership, and Corporate Diversification." *Journal of Finance*, vol. 52, no. 1 (March):135–160.

Dhalla, N. K. (1980). Advertising as an antirecession tool, Harvard Business Review 58 (1), 158-165.

Dreman, D., and Berry, M., 1995. "Analyst Forecasting Errors and Their Implications for Security Analysis." *Financial Analysis Journal*, vol. 51, no. 3 (May/June):30-41.

Dong, M., D. Hirshleifer, S. Richardson, and S. H. Teoh, 2002, "Does investor misvaluation drive the takeover market?", Working paper, Ohio State University, York University and Wharton School.

Dobbs, R.F., Karakolev T. and Malige F., 2002. "Learning to love recession", McKinsey Quarterly 2 (special Edition), 6-9.

Downs J., Goodman J.E., *Dictionary of Finance and Investment Terms.* Barron's Educational Series, Seventh Edition, 2006

Espinosa-Vega, Marco A. and Jang-Ting Guo (2001), "On Business Cycles and Countercyclical Policies," *Fed. Res. Bank Atl. Econ. Rev.*, Fourth Quarter 2001, pp. 1-11.

Esty, B.C., 2000. What Determines Comparability When Valuing Firms With Multiples? *Journal of Financial Education* 2, 24-33.

Fama, E. F. and K. R. French, 1996, Multifactor explanations of asset pricing anomalies, *Journal of Finance* 51, 55–84.

Farmer, Roger E.A., and Jang-Ting Guo (1994), "Real Business Cycles and the Animal Spirits hypothesis," *Journal of Economic Theory*, Vol. 63, pp. 42-72.

Fidanza B., 2008, "The Valuation by Multiples of Italian Firms", University of Macerata, Dipartimento di studi sullo sviluppo Economico, w.p. n. 14, May/2008.

Field, A. (1985), "Bad Economics Drives Out Good," *Forbes*, 18 November, pp.78-82.

Fischer, Stanley. (1977), "Long-Term Contracts, Rational Expectations, and the Optimal Money Supply Rule," *J. Polito Econ.*, Vol. 85, No.1, pp. 191-205.

Foster, G. *Financial Statement Analysis.* New York: Prentice Hill, 1986.

Francis, J. and D, Philbrick, 1993, "Analysts' Decisions as Products of a Multi-Task Environment. "*Journal of Accounting Research*, Vol. 31 (2), Autumn, 216-230.

Franks, J., R. Harris, and S. Titman, 1991, "The postmerger share-price performance of acquiring firms", *Journal of Financial Economics* 29, 81–96.

Friedman, Milton (1982), *Monetary Trends in the United States and the United Kingdom: Their Relation to Income, Prices, and Interest Rates,* 1867-1975, Chicago: U. of Chicago Press for NBER.

Gilson, S.C., E.S. Hotchkiss, and R.S. Ruback. 2000. "Valuation of Bankrupt Firms." *Review of Financial Studies*, vol. 13, no. 1 (Spring):43–74.

Giovannini M., *La valutazione aziendale secondo l'approccio "Topo-Down": come scegliere tra differenti mercati, settori e titoli.* Sede Amministrativa del Dottorato di Ricerca - Università degli Studi di Trieste, 2006/2007

Haberler, Gottfried ([1937] 1964), *Prosperity and Depression,* New edition, first published by the League of Nations, Cambridge, MA: Harvard U. Press.

von Hayek, Friedrich A. (1933), *Monetary Theory and the Trade Cycle,* NY: Harcourt, Brace & Co.

Herrmann, V., Richter, F., 2003. "Pricing with Performance-Controlled Multiples". *Schmalenbach Business Review* 55, 194-219.

Hicks, John R. (1950), A *Contribution to the Theory ofthe Trade Cycle,* Oxford: Clarendon Press.

Hotchkiss, E.S., and R.M. Mooradian. 1998. "Acquisitions as Means of Restructuring Firms in Chapter 11." *Journal of Financial Intermediation*, vol. 7, no. 3 (July):240–262.

Keynes, John M. (1936), *The General Theory of Employment, Interest, and Money,* London: Macmillan & Co.

Kaplan, S.N., and R. Ruback. 1995. "The Valuation of Cash Flow Forecasts: An Empirical Analysis." *Journal of Finance*, vol. 50, no. 4 (September):1059–93.

Kaplan, S.N., Ruback, R.S., 1996. "The Market Pricing of Cash Flow Forecasts: Discounted Cash Flow vs. the Method of Comparables". *Journal of Applied Corporate Finance* 8, 45-60.

Kim, M., and J.R. Ritter. 1999. "Valuing IPOs." *Journal of Financial Economics*, vol. 53, no. 3 (September):409–437.

Lee, C. M., J. Myers, and B. Swaminathan, 1999, What is the intrinsic value of the DowJ., *Journal of Finance* 54, 1693–1741.

Lee, K. M., 2007, *Accounting for Investments Analysts – An international perspective,* 4th edition, BG Consulting Group Ltd

Lehman Brothers, *The investment banker's handbook – IBD analyst programme 2008,* The Corporate Training Group 2008, 2008.

Lie, E., Lie, H.J., 2002. "Multiples Used to Estimate Corporate Value". *Financial Analysts Journal* 58, 44-54.

Liu J., Nissim D., and Thomas J., "Equity Valuation Using Multiples", *Journal of Accounting Research,* 40 (2002): 135-172.

Liu, J., Nissim, D., Thomas, J.K., 2002b. "International equity valuation using multiples". Working paper, UCLA, Columbia University, Yale University.

Liu, J., Nissim, D., Thomas, J.K., 2005a. "Cash flow is King? Comparing valuations based on cash flow versus earnings multiples". Working paper, UCLA, Columbia University, Yale University.

Liu, J., Nissim, D., Thomas, J.K., 2005b. "Value relevance of cash flow versus earnings: an international analysis using multiples". Working paper, UCLA, Columbia University, Yale University.

Loughran, T. and A. M. Vijh, 1997, "Do long-term shareholders benefit from corporate acquisitions?", *Journal of Finance* 52, 1765–1790.

Mascarenhas, Briance and David A. Aaker (1989), "Strategy Over the Business Cycle," *Strategic Management Journal,* Vol. 10, pp. 199-210.

Massari M., Zanetti L., *Valutazione Finanziaria,* McGraw-Hill, 2004.

Mathews J. A., "Strategy and the Crystal Cycle", *California Management Review,* Vol. 47, No. 2, Winter 2005.

Meitner M., 2003, "Option-style multi-factor comparable company valuation for practical use", ZEW Discussion Papers.

von Mises, Ludwig (1928), *Geldwertstabllisierung and Konjunkturpolitik* [Monetary Stabilization and Cyclical Policy], Jena: Gustav Fischer.

Moeller, S. B., F. P. Schlingemann, and R. M. Stulz, 2003, “Wealth destruction on a massive scale? A study of acquiring-firm returns in the merger wave of the late 1990s”, Working Paper, The Ohio State University.

Moeller, S. B., F. P. Schlingemann, and R. Stulz, 2003, “Do shareholders of acquiring firms gain from acquisitions?”, The Ohio State University, Dice Center Working Paper Series 2003-4.

Navarro P., “The Well-Timed Strategy Managing the Business Cycle”, California Management Review, Vol. 48, N.1, Fall 2005.

Noam E.M., “The Emerging Cyclicality of the Telecom Industry”, Columbia University, New York, *Global Economy and Digital Society*, Elsevier B.V., 2004.

Ohlson, J., 1995, “Earnings, book values, and dividends in equity valuation”, *Contemporary Accounting Research* 11, 661–687.

Ohlson J.A., Dhananjay D.K. G., “A Unified Valuation Framework for Dividends, Free Cash Flow, Residual Income, and Earnings Growth Based Models” , New York University - Department of Accounting, Taxation & Business Law and Arizona State University, 2006.

Olsen, Robert. 1996. "Implications of Herding Behaviour for Earnings Estimation, Risk Assessment, and Stock Returns." *Financial Analysts journal,* vol. 52, no. 4 July/August):37-51.

Palepu K., Healy P., Bernard V.; “Business Analysis and Valuation – Using Financial Statements”; 2^ Edition; South –Western College Publishing, Thomson Learning; 2000.

Prescott, Edward C. (1986), "Theory ahead of Business Cycle Measurement," *Federal Reserve Bank of Minneapolis, Quarterly Review,* Fall 1986, pp. 9-22.

Rau, P. R. and T. Vermaelen, 1998, “Glamour, value and the post-acquisition performance of acquiring firms”, *Journal of Financial Economics* 49, 223–253.

Rigby, D. (2001). Moving upward in the downturn, Harvard Business Review 79 (6), 98-106.

Ross, S.A; Westerfield, R. W.; Jaffe J., “Corporate finance” 7th edition, McGraw Hill International Edition, 2005.

Samuelson, Paul A. (1939), "Interactions Between the Multiplier Analysis and the Principle of Acceleration," *Rev. Econ. Statist.,* Vol. 21, No.2, pp. 75-78.

Schipper, K., 1991, “Commentary on Analysts' Forecasts.” Accounting Horizons, December, 105-121.

Schumpeter, Joseph A. (1939), *Business cycles: A theoretical, historical, and statistical analysis of the capitalist process,* 2 voIs., NY: McGraw-HilI.

Shiller, Robert J. (2000), *Irrational Exuberance,* Princeton, NJ : Princeton University Press.

Smit Han T.J., and Trigeorgis L., *“Strategic Investment : Real Options and Games”* - 471 pages (2004), Princeton University Press.

Srinivasan R., Gillen Lilien G.L. and Rangaswamy A., 2002. “Turning adversity into advantage: Does proactive marketing during a recession pay off?”, Working paper ISBN Report 15-2002, The Pennsylvania State University.

Tobin, James (1975), "Keynesian Models of Recession and Depression," *Amer. Econ. Rev.*, Vol. 65, No.2, pp. 195-202.

Trigeorgis, L. 1996. *Real Options*. Cambridge, MA: MIT Press.

Trueman, B., 1990, "On the Incentives for Security Analysts to revise their earnings forecasts." *Contemporary Accounting Research*, Vol. 7 (1), 203-222.

White, Sondhi, Fried, *The Analysis and Use of Financial Statements*, 3rd Edition, John Wiley & Sons, 2003.

Wicksell, Knut ([1898] 1936), *Interest and Prices: A Study of the Causes Regulating the Value of Money,* London: Macmillan.

Zara C., 2005, *Valutazione finanziaria per le decisioni di investimento,* Impresa&professioni, Finanza e mercati, Egea Spa.

Databases:
Thomson One Banker
I/B/E/S Global Aggregate Database
Bloomberg Financial Database

Web sources:
www.nber.org/cycles.html
http://finance.google.co.uk.